lesson 5: you eat what?!

estimated time
2½–3 hours

science GLEs
EC.2.A.4.a. Classify populations of organisms as producers, consumers, or decomposers by the role they serve in the ecosystem
EC.2.A.4.b. Differentiate between the three types of consumers (herbivore, carnivore, omnivore)

vocabulary
Herbivore
Carnivore
Omnivore
Decomposer
Scavenger

lesson objectives
1. Explain how herbivores, carnivores and omnivores are different.
2. Categorize consumers by what they eat.
3. Define the role of decomposers in the ecosystem.
4. Classify organisms as producers, consumers or decomposers by the role they play in pond, forest and prairie ecosystems.
5. Explain how the teeth on an animal's skull can help identify the type of consumer it is.

essential questions for the lesson
1. How do you know if a consumer is an herbivore, carnivore or omnivore?
2. What type of "vore" are you?
3. Why are decomposers and scavengers important in ecosystems?

teacher notes
Students should have read Chapter 5, "You Eat What?!," on pages 24–27 of their student books prior to engaging in these activities. *Ecosystem Cards* should be prepared in advance.

All *Ecosystem Cards* will be used together in Lesson 6. In Lesson 5, the *Pond Ecosystem Cards* are used in *Activity 5.1*, the *Forest Ecosystem Cards* are used in *Activity 5.2* and the *Prairie Ecosystem Cards* are used in *Activity 5.3*. For these individual activities, the Human card should be removed and set aside. All three Human cards will be used in the culminating ecosystems activity in Lesson 6.

It is recommended to:
- Copy and laminate the *Pond Ecosystem Cards/Forest Ecosystem Cards/Prairie Ecosystem Cards*.
- Punch two holes on either side of the top of each card.
- Lace yarn through the holes and tie the ends together. Yarn should be long enough to go easily over the heads of students and hang loosely enough around their necks to allow them easy access to the information on the cards.
- Separate the cards into the three ecosystems: *Pond Ecosystem Cards/Forest Ecosystem Cards/ Prairie Ecosystem Cards*.

In reality, many animals often move from one ecosystem to another. To demonstrate this for students and to increase the number of predator/prey relationships when using the *Ecosystem Cards*, the animals listed below may be found in more than one set of *Ecosystem Cards*.

However, the environment description on the *Ecosystem Cards* will only describe the primary ecosystem for each of these "cross-over" animals (based on the three posters in Chapter 2 of the student book). On the teacher *Ecosystem Card Keys*, primary ecosystems for all organisms will be underlined and noted in bold letters. Ecosystems other than an animal's primary ecosystem will be shown within brackets.

Badger — Pond, [Forest], **Prairie**
Bobcat — Pond, **Forest**, [Prairie]
Great horned owl — Pond, **Forest**, [Prairie]
Green darner dragonfly — **Pond**, Forest, [Prairie]
Human — **Pond**, **Forest**, **Prairie**
Pileated woodpecker — Pond, **Forest**, [Prairie]
White-tailed deer — [Pond], **Forest**, [Prairie]

outline of answers to objectives See following page.

essential activities

Activity 5.1: Are There Any "Free" Pond Lunches?
Activity 5.2: Are There Any "Free" Forest Lunches?
Activity 5.3: Are There Any "Free" Prairie Lunches?
Activity 5.4: Schoolyard Ecosystem Investigation

optional activities

Optional Activity 5.A: Animal Teeth—It's All About the Food
Optional Activity 5.B: Life on the Forest Floor
Optional Activity 5.C: Worms in School

summary

Animals are classified by the type of food they eat. Plant eaters are herbivores, and meat eaters are carnivores. Animals that eat both plants and meat are omnivores.

Herbivores and carnivores can be identified by looking at their teeth. Decomposers are organisms that eat dead plants and animals. They digest and break down dead organisms into tiny nutrients, which are then returned to the soil. Scavengers also clean up dead and decaying organisms.

outline of answers to objectives—lesson 5

1. Explain how herbivores, carnivores and omnivores are different. (pages 24–26)
   a. Herbivores are animals that eat only plants.
   b. Carnivores are animals that eat only meat. They hunt other animals for food.
   c. Omnivores are animals that eat both plants and animals.

2. Categorize consumers by what they eat. (pages 24–27)
   a. Herbivores
      i. Pond ecosystems: water fleas, snails, tadpoles, beavers
      ii. Forest ecosystems: deer, fox squirrels, woodland voles, spicebush swallowtail caterpillars and butterflies
      iii. Prairie ecosystems: gophers, regal fritillary caterpillars and butterflies, leaf beetles
   b. Carnivores
      i. Pond ecosystems: dragonfly nymph, fish, northern water snake
      ii. Forest ecosystems: bobcats, great horned owls, gray tree frogs, centipedes, rough green snakes, hawks
      iii. Prairie ecosystems: hawks, crawfish frogs, skinks, spiders, prairie mound ants, badgers, snakes
   c. Omnivores
      i. Pond ecosystems: muskrat, northern crayfish, raccoons, channel catfish
      ii. Forest ecosystems: turkey, three-toed box turtles, skunks
      iii. Prairie ecosystems: bobolinks, prairie-chicken adults, prairie mole crickets, grasshopper sparrows

3. Define the role of decomposers in the ecosystem. (page 27)
   a. They eat and break down scat (animal waste, feces) and dead organisms (plants and animals) into tiny nutrients.
   b. Examples:
      i. Pond ecosystems: northern crayfish, insects, bacteria and fungi
      ii. Forest ecosystems: sowbugs, carpenter ants, termites, beetles, fungi and bacteria
      iii. Prairie ecosystems: sowbugs, carpenter ants, termites, beetles, fungi and bacteria

      Note: Scavengers are not decomposers, but they are very important in keeping an ecosystem clean by feeding on dead and decaying organisms. Earthworms and vultures are examples.

4. Classify organisms as producers, consumers or decomposers by the role they play in prairie, forest and pond ecosystems. See *Activity 5.2: Are There Any "Free" Forest Lunches?* and *Activity 5.3: Are There Any "Free" Prairie Lunches?*

5. Explain how the teeth on an animal's skull can help identify the type of consumer it is. (page 26)
   a. Herbivores: large, sharp front teeth that help them snip off grasses and leaves; grinding teeth in the back of the mouth that help crush seeds and tough plant parts.
   b. Carnivores: large flat teeth line the sides of the mouth for grinding up meat and bones; long, sharp pointed teeth on either side of sharp front teeth that grip and tear up meat.
   c. Omnivores: some have teeth like herbivores and carnivores. Others like robins and turkeys have no teeth; instead they have beaks that help them capture insects and eat seeds and fruits

activity 5.1 : are there any "free" pond lunches?

estimated time 30–40 minutes

objectives

Students will be able to

1. Categorize consumers by what they eat.
2. Explain how herbivores, carnivores and omnivores are different.
3. Define the roles of decomposers in an ecosystem.
4. Classify decomposers and scavengers by the role they play in pond ecosystems.

teacher preparation

Students should have read Chapter 5, "You Eat What?!," on pages 24–27 of their student books prior to engaging in this activity. This is an outdoor activity and will require a large, open area. *Pond Ecosystem Cards* will be used to demonstrate how herbivores, carnivores and omnivores differ, not only in what they eat, but also in the variety and availability of food sources.

Use only the *Pond Ecosystem Cards* for this activity, but *REMOVE THE HUMAN CARD*.

The purpose of this activity is to reinforce each objective as well as give students an opportunity to explore food chains related specifically to a pond ecosystem. Graphic organizers (data table and graph) should be copied in advance unless students are instructed to create these directly in their science notebooks.

NOTE: For quick teacher reference, each *Pond Ecosystem Card* is marked with a single bar on the lower right corner.

materials

Science notebooks
Pencils
Thermometers
Flip chart or small white board and markers
*Pond Ecosystem Card*s (with Human card removed)
Pond Ecosystem Cards Teacher Key
Activity 5.1 Data Table/Bar Graph copies

procedure

1. Have students complete the heading in their science notebooks and take and record the outside air temperature.

2. Place the balls of yarn in the center of the open area. Shuffle and distribute one *Pond Ecosystem Card* randomly to each student. Make certain that a student receives the Sun card.

3. After students have read their cards carefully, indicate a place where all the herbivores should stand together, where all the carnivores should stand together, and where all the omnivores should stand together. Have students in the "vore" groups check each other's cards to be sure everyone is sorted out correctly. Students with producer cards and the Sun card should remain apart from the "vore" groups.

4. Address the entire class:
   Q. Based on the organism on your card, raise your hand if you are a consumer.
   A. All but the producers and the sun should raise their hands.
   Q. Raise your hand if you're a type of consumer called an herbivore.
   A. Check for accuracy.
   Q. Raise your hand if you're a type of consumer called a carnivore.
   A. Check for accuracy.
   Q. Raise your hand if you're a type of consumer called an omnivore.
   A. Check for accuracy.

5. Any consumers here who have not raised their hand yet?
   Q. What type of consumers are you?
   A. Decomposers and scavengers.
   Q. What is the difference between decomposers and scavengers?
   A. Decomposers are special organisms (bacteria, fungi) that eat and break down scat, and dead plants and animals into tiny parts. Scavengers (northern crayfish, common snapping turtles, etc.) seek out and eat dead and decaying organisms.

6. Bring the student with the Sun card to the center of the open area near the balls of yarn and remind him/her of the important role he/she is about to play.

7. Address the entire class:
   Q. Which organisms should be connected directly to the Sun?
   A. Producers.

8. Have producers raise their hands, and choose one producer at a time to step forward. While the Sun is holding the end of a ball of yarn and unwinding it and handing it to the producer, ask:
   Q. What organism are you?
   A. Algae, duckweed, arrowhead, etc.
   Q. What role do you play in an ecosystem?
   A. Producer.
   Q. Why do you think you should connect to this food chain here?
   A. I get energy to make my own food directly from the sun.
   Q. In what ecosystem would you commonly be found?
   A. Pond.

9. Continue linking producers to the Sun until they are either all linked *OR* until the Sun has used all the available balls of yarn. Have any unlinked producers stand over to the side.
   Q. What might happen to a producer that does not receive enough sun, water, nutrients, etc.?
   A. It might die.
   Q. What happens to producers that die?
   A. They begin to break down or decompose and eventually become part of the soil.

10. Indicate a place off to the side of the group as the place for unlinked/decomposing organisms. Ask students to give the place a name. The name could be funny/clever/etc. but should relate to decomposition (Ex: Decomp Hill; Soil Will Be Us; Break Down Dump).

    Throughout this entire activity, send any students incorrectly attempting to link to a food chain (based on the information on their cards) to the decomposition area.

11. Repeat the process with consumers. Ask the consumers (who could be linked to one of the available producers linked to the Sun) to raise their hands. Choose students randomly, have them stand next to a producer they would consume and ask each one:
    Q. What organism are you?
    A. Answers will vary but should include animals only.
    Q. What kind of consumer are you?
    A. Answers will vary but should include herbivores, omnivores, scavengers and decomposers only.
    Q. What role do you play in an ecosystem?
    A. Answers will vary. Depending on the specific organism, answers should include:
    - Consumers eat producers and other consumers and help to pass energy up through a food chain.
    - Herbivores eat producers and help to pass energy up through the food chain.
    - Omnivores eat producers and other consumers and help to pass energy up through the food chain.
    - Scavengers seek out and eat dead and decaying organisms and help to keep an ecosystem clean.
    - Decomposers eat and break down scat and dead and decaying plants and animals into tiny parts.

Q. Why do you think you should connect to this food chain here?

A. Answers will vary but should be based on information on their cards. (Ex: Because I am a consumer/herbivore/omnivore that consumes [names the particular plant to which they will connect] for energy; Because I am a scavenger/decomposer and I consume dead and decaying plants. This plant is dead and decaying.)

12. Have students unwind the ball of yarn as it is passed to the consumer. Enough yarn should be unwound to allow about two feet of space between them. The sun and all producers and consumers should continue to hold onto the piece of yarn.

13. Address any organisms remaining in the herbivore group:

Q. What has happened to these herbivores?

A. There are no producers left for them to eat.

Q. What could happen to them?

A. These herbivores would either starve or move away (if possible) to find producers somewhere else.

Q. Where should we place them now?

A. In the decomposition area!

14. If a decomposer has linked to a producer (which is possible):

Q. What is happening to a food chain that includes the sun, a producer and a decomposer?

A. The producer has died, and the decomposer is breaking it down into tiny parts.

Q. Would it be the end of a food chain if a decomposer linked up with a decaying plant?

A. Not necessarily. If a northern crayfish (considered a decomposer and a scavenger) linked with a "decaying" producer, there are other consumers that could still consume (link up with) the northern crayfish.

15. Continue the process with the remaining consumers. Ask students who think they could link with one of the food chains to raise their hands. Choose students randomly and repeat the questions for each student as they step up to their chosen chain and unwind and pass along the ball of yarn.

Q. What organism are you?

A. Answers will vary but should include animals, scavengers and decomposers only.

Q. What kind of consumer are you?

A. Answers will vary but should include carnivores, omnivores, scavengers and decomposers only.

Q. What role do you play in an ecosystem?

A. Answers will vary. Depending on the specific organism, answers should include:

- Consumers eat producers and other consumers and help to pass energy up through a food chain.
- Carnivores eat other consumers and help to pass energy up through the food chain.
- Omnivores eat producers and other consumers and help to pass energy up through the food chain.
- Scavengers seek out and eat dead and decaying organisms and help to keep an ecosystem clean.
- Decomposers eat and break down scat and dead and decaying plants and animals into tiny parts.

Q. Why do you think you should connect to this food chain here?

A. Answers will vary but should be based on information on their cards. (Ex: Because I am a consumer/carnivore /omnivore that consumes [names the particular animal to which they will connect] for energy; Because I am a scavenger/decomposer and I consume dead and decaying animals. This animal is dead and decaying.)

16. Repeat the process, asking for students to step up as part of the next link in one of the food chains. Students from this point on should be carnivores, omnivores, scavengers or decomposers only but must reference the information on their card to prove that they would eat the organism to which they plan to link.

    Continue until all students are linked to a food chain or unlinked students/consumers have no place to connect. Send unlinked students to the decomposition area.

17. Use a flip chart or small white board to capture the following information for all food chains. Have students use the data table provided to organize the information.
    Q. How many producers?
    Q. How many herbivores?
    Q. How many carnivores?
    Q. How many omnivores?
    Q. How many decomposers and scavengers?
    Q. How many decomposing organisms left at the decomposition area?

    Q. Who or what is going to clean up all those decomposing organisms?
    A. Other decomposers (bacteria, northern crayfish, etc.) and scavengers (northern crayfish, common snapping turtles, etc.).

18. Have students roll up the balls of yarn and place them in the center of the open area. Collect and redistribute the cards randomly. **Instruct students to create new food chains on their own for their pond ecosystem.** This could create something close to chaos as students read their cards, find the Sun, question each other and attempt to link with a food chain. Students who think they cannot connect into any of the chains should move to the decomposition area.

19. Quickly review and discuss each component of each food chain. (If students are confident in their understanding of the concepts, have them attempt these food chain reviews in "speed talk.") Send any students linked incorrectly to the decomposition area, and randomly select a student already in the decomposition area and see if he/she can connect somewhere in one of the chains without jeopardizing a student already in place.

20. Record the number of each type of organism linked somewhere in the food chains and include those numbers as a second set on the flip chart/white board. Have students record this data in their *Data Tables*.

21. Using data from their *Data Tables*, have students work in groups to use the graph provided to create a bar graph.

22. Have students look at their graph to answer the following:
    Q. Which type of organism had the highest number?
    Q. Which type of organism had the lowest number?
    Q. What did you notice about the numbers of these organisms?
    A. Answers will vary. There are more producers. There are more omnivores than herbivores or carnivores. There are many decomposing organisms, etc.
    Q. How would you explain this?
    A. Answers will vary. As long as there is sunlight, air, water, nutrients, space and temperature, producers will grow. Omnivores have more choices and are able to eat a larger variety of food. Basically, there really are no free lunches, and even omnivores sometimes have difficulty finding food. However, there were always students "decomposing" and returning nutrients back into the soil.

23. Have students revisit their *Big Chart: Pond Ecosystem* and place an X or a check mark indicating whether each organism listed is an herbivore, carnivore, omnivore, decomposer or scavenger.

Wrap-up/formative assessment

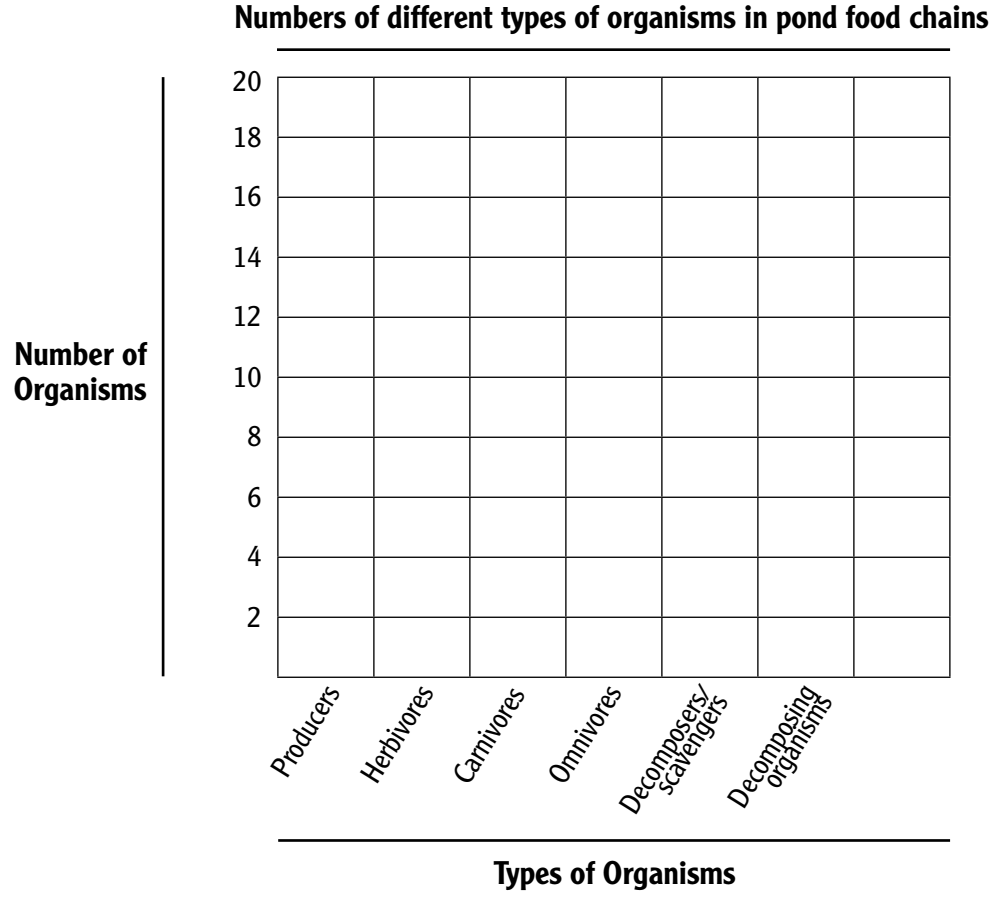
See *Wrap-Up/Formative Assessments* in the Teacher Notes section of the introductory material to choose a strategy that meets student needs.

pond ecosystem data table

Kinds of organisms	Number of organisms in 1st set of pond food chains	Number of organisms in 2nd set of pond food chains	Total
Producers			
Herbivores			
Carnivores			
Omnivores			
Decomposers & scavengers			
Decomposing organisms			

pond ecosystem graph

Complete a bar graph below using the information from the Total column in your data table.



algae

what it eats: Produces its own food using energy from the sun

what eats it: Giant floater mussels, yellow drake mayflies, northern crayfish, bluegill fish, water fleas, green frog tadpoles, pond snails, red-eared slider turtles, fathead minnows

environment: Free floating in the water, attaching to rocks, plants and other surfaces

bluegill fish

what it eats: Water striders, blue-fronted dancer damselflies, yellow drake mayflies, northern crayfish, fathead minnows, algae

what eats it: Largemouth bass, great blue herons, northern water snakes, humans

environment: Among plants near shore of an enclosed deep body of water

black willow tree

what it eats: Produces its own food using energy from the sun

what eats it: **Leaves eaten by**—white-tailed deer; **Roots and stems eaten by**—muskrats

environment: Low, wet areas along the water in full sun

cattail

what it eats: Produces its own food using energy from the sun

what eats it: Muskrats

environment: Banks and shallow areas of an enclosed body of fresh water

blue-fronted dancer damselfly

what it eats: **Adults eat**—water fleas; **Nymphs eat**—predacious diving beetles

what eats it: **Adults eaten by**—mallard ducks, green darner dragonflies; **Nymphs eaten by**—bluegill fish, predacious diving beetles, green frogs, red-eared slider turtles, yellow drake mayflies, fathead minnows

environment: In and near enclosed bodies of fresh water

channel catfish

what it eats: **Living and dead**—fishing spiders, fathead minnows, northern crayfish, duckweed

what eats it: Common snapping turtles, humans

environment: Near the bottom of small, deep bodies of water

common carp

what it eats: **Living and dead**—fishing spiders, coontails, duckweed

what eats it: Humans, largemouth bass, great blue herons

environment: In deeper pools of water around submerged logs

coontail

what it eats: Produces its own food using energy from the sun

what eats it: Mallard ducks, red-eared slider turtles, common snapping turtles, common carp, northern crayfish

environment: In small body of clear-to-murky water up to 20 feet deep

common sedge

what it eats: Produces its own food using energy from the sun

what eats it: **Seeds eaten by**—mallard ducks

environment: Banks of small, deep bodies of water

duckweed

what it eats: Produces its own food using energy from the sun

what eats it: Mallard ducks, common carp, red-eared slider turtles, northern crayfish, channel catfish

environment: Floats on surface of small, deep bodies of water

common snapping turtle

what it eats: **Living and dead**—aquatic plants, channel catfish, northern crayfish, green frogs, coontails

what eats it: **Eggs and young eaten by**—raccoons, northern water snakes

environment: In an enclosed body of water with muddy bottoms, submerged logs and plenty of vegetation

fathead minnow

what it eats: Algae, green darner dragonflies, blue-fronted dancer damselflies

what eats it: Largemouth bass, bluegill fish, channel catfish, northern water snakes, great blue herons, green frogs, raccoons

environment: In a small area of water surrounded by land

fishing spider

what it eats: Water striders, predacious diving beetles

what eats it: Green frogs, channel catfish, largemouth bass, common carp

environment: Among plants on or near the bank of an enclosed body of fresh water

green darner dragonfly

what it eats: **Adults eat**—blue-fronted dancer damselflies, yellow drake mayflies; **Nymphs eat**—predacious diving beetles, green frog tadpoles

what eats it: **Adults eaten by**—green frogs; **Nymphs eaten by**—largemouth bass, predacious diving beetles, green frogs, red-eared slider turtles, northern harrier hawks, yellow garden spiders, fathead minnows

environment: **Adults**—near a small, deep body of water; **Nymphs**—in the water

giant floater mussel

what it eats: Algae, water fleas

what eats it: Muskrats, raccoons, red-eared slider turtles, great blue herons

environment: Bottom of a small, deep body of water

green frog

what it eats: **Adults eat**—blue-fronted dancer damselflies, green darner dragonflies, yellow drake mayflies, water striders, fishing spiders, predacious diving beetles, northern crayfish, fathead minnows, pond snails; **Tadpoles eat**—algae

what eats it: Northern water snakes, common snapping turtles, largemouth bass, great blue herons, raccoons, muskrats, humans; **Tadpoles eaten by**—green darner dragonfly nymphs, predacious diving beetles

environment: In algae and among aquatic plants

great blue heron

what it eats: Bluegill fish, common carp, fathead minnows, young largemouth bass, green frogs, northern water snakes, red-eared slider turtles, giant floater mussels, pond snails, northern crayfish

what eats it: Raccoons

environment: Near bodies of water

human

what it eats: Blackberries, bluegill fish, bobwhite quail, channel catfish, common carp, fox squirrels, green frogs, hickory nuts, largemouth bass, mallard ducks, muskrats, raccoons, white-tailed deer, wild turkeys, northern crayfish

what eats it: None

environment: Found in more than one ecosystem

largemouth bass

what it eats: Bluegill fish, common carp, channel catfish, fathead minnows, northern crayfish, green frogs, water fleas, green darner dragonflies, fishing spiders, predacious diving beetles

what eats it: Humans, great blue herons, raccoons, northern water snakes

environment: In warm, clear water

northern crayfish

what it eats: Algae; **Decaying—**yellow water lilies, coontail, duckweed

what eats it: Channel catfish, largemouth bass, bluegill fish, red-eared slider turtles, common snapping turtles, green frogs, northern water snakes, great blue herons, mallard ducks, raccoons, muskrats, humans

environment: Bodies of open and enclosed water

mallard duck

what it eats: Duckweed, coontail, water primrose, common sedge, pin oak trees, water striders, yellow drake mayflies, blue-fronted dancer damselflies, pond snails, predacious diving beetles, northern crayfish

what eats it: Humans, raccoons

environment: In and around enclosed bodies of fresh water

northern water snake

what it eats: Largemouth bass, bluegill fish, fathead minnows, northern crayfish, green frogs, common snapping turtles

what eats it: Great blue herons, raccoons, red-eared slider turtles

environment: In a small, deep body of water

muskrat

what it eats: Yellow water lilies, black willow trees, cattails, giant floater mussels, northern crayfish, green frogs

what eats it: Humans

environment: In and around enclosed bodies of water

pin oak tree

what it eats: Produces its own food using energy from the sun

what eats it: **Acorns eaten by**—mallard ducks, raccoons, white-tailed deer; **Leaves and twigs eaten by**—white-tailed deer

environment: Near enclosed and open bodies of water

pond snail

what it eats: Algae

what eats it: Common carp, green frogs, red-eared slider turtles, great blue herons, mallard ducks

environment: In water surrounded by land

red-eared slider turtle

what it eats: Water striders, pond snails, northern crayfish, giant floater mussels, duckweed, coontail, algae; Nymphs of green darner dragonflies, yellow drake mayflies and blue-fronted dancer damselflies

what eats it: Raccoons, great blue herons; **Eggs and young eaten by**—northern water snakes

environment: In and around an area of water surrounded by land

predacious diving beetle

what it eats: Nymphs of green darner dragonflies, blue-fronted dancer damselflies and yellow drake mayflies; Green frog tadpoles

what eats it: Predacious diving beetles, fishing spiders, largemouth bass, green frogs, mallard ducks; **Eaten by nymphs of**—green darner dragonflies and blue-fronted dancer damselflies

environment: Body of water surrounded by land

water flea

what it eats: Algae, water fleas

what eats it: Water fleas, water striders, blue-fronted dancer damselflies, yellow drake mayflies, giant floater mussels, young largemouth bass

environment: Body of water

raccoon

what it eats: Pin oak trees, northern crayfish, northern water snakes, fathead minnows, largemouth bass, green frogs, giant floater mussels, mallard ducks, common snapping turtles, red-eared slider turtles, great blue herons

what eats it: Humans

environment: Areas near enclosed bodies of water

water primrose

what it eats: Produces its own food using energy from the sun

what eats it: **Seeds eaten by**—white-tailed deer, mallard ducks

environment: In an area of water surrounded by land

water strider

what it eats: Water fleas

what eats it: Green frogs, bluegill fish, fishing spiders, red-eared slider turtles, mallard ducks

environment: Surface of a small area of water surrounded by land

yellow drake mayfly

what it eats: **Adults**—do not eat; **Nymphs eat**—water fleas, blue-fronted dancer damselfly nymphs, algae

what eats it: **Adults eaten by**—mallard ducks, green frogs, green darner dragonflies; **Nymphs eaten by**—bluegill fish, predacious diving beetles, green frogs, red-eared slider turtles

environment: In and near the water

white-tailed deer

what it eats: White oak trees,Virginia creeper vines, mayapples, mosses, shelf mushrooms, flowering dogwood trees, sassafras trees, hickory trees, blue violets, redcedar trees, red maple trees, pin oak trees, black willow trees, little bluestem, big bluestem, switch grass, Indian grass, sideoats grama grass, prairie blazing star, purple coneflowers, gaura, compass plants, blackberries, water primrose

what eats it: Humans, bobcats

environment: Wooded areas

yellow water lily

what it eats: Produces its own food using energy from the sun

what eats it: Muskrats, northern crayfish

environment: Enclosed bodies of fresh water

sun

Organism	Key
algae **what it eats:** Produces its own food using energy from the sun **what eats it:** Giant floater mussels, yellow drake mayflies, northern crayfish, bluegill fish, water fleas, green frog tadpoles, pond snails, red-eared slider turtles, fathead minnows **environment:** Free floating in the water, attaching to rocks, plants and other surfaces	**Pond**, Forest, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
black willow tree **what it eats:** Produces its own food using energy from the sun **what eats it:** **Leaves eaten by**—white-tailed deer; **Roots and stems eaten by**—muskrats **environment:** Low, wet areas along the water in full sun	**Pond**, Forest, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
blue-fronted dancer damselfly **what it eats:** **Adults eat**—water fleas; **Nymphs eat**—predacious diving beetles **what eats it:** **Adults eaten by**—mallard ducks, green darner dragonflies; **Nymphs eaten by**—bluegill fish, predacious diving beetles, green frogs, red-eared slider turtles, yellow drake mayflies, fathead minnows **environment:** In and near enclosed bodies of fresh water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
bluegill fish **what it eats:** Water striders, blue-fronted dancer damselflies, yellow drake mayflies, northern crayfish, fathead minnows, algae **what eats it:** Largemouth bass, great blue herons, northern water snakes, humans **environment:** Among plants near shore of an enclosed deep body of water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
cattail **what it eats:** Produces its own food using energy from the sun **what eats it:** Muskrats **environment:** Banks and shallow areas of an enclosed body of fresh water	**Pond**, Forest, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator

Organism	Key
channel catfish **what it eats:** **Living and dead**—fishing spiders, fathead minnows, northern crayfish, duckweed **what eats it:** Common snapping turtles, humans **environment:** Near the bottom of small, deep bodies of water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, **Scavenger** **Prey**, **Predator**
common carp **what it eats:** **Living and dead**—fishing spiders, coontails, duckweed **what eats it:** Humans, largemouth bass, great blue herons **environment:** In deeper pools of water around submerged logs	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
common sedge **what it eats:** Produces its own food using energy from the sun **what eats it:** **Seeds eaten by**—mallard ducks **environment:** Banks of small, deep bodies of water	**Pond**, Forest, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
common snapping turtle **what it eats:** **Living and dead**—aquatic plants, channel catfish, northern crayfish, green frogs, coontails **what eats it:** **Eggs and young eaten by**—raccoons, northern water snakes **environment:** In an enclosed body of water with muddy bottoms, submerged logs and plenty of vegetation	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, **Scavenger** **Prey**, **Predator**
coontail **what it eats:** Produces its own food using energy from the sun **what eats it:** Mallard ducks, red-eared slider turtles, common snapping turtles, common carp, northern crayfish **environment:** In small body of clear-to-murky water up to 20 feet deep	**Pond**, Forest, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator

Organism	Key
duckweed **what it eats:** Produces its own food using energy from the sun **what eats it:** Mallard ducks, common carp, red-eared slider turtles, northern crayfish, channel catfish **environment:** Floats on surface of small, deep bodies of water	**Pond**, Forest, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
fathead minnow **what it eats:** Algae, green darner dragonflies, blue-fronted dancer damselflies **what eats it:** Largemouth bass, bluegill fish, channel catfish, northern water snakes, great blue herons, green frogs, raccoons **environment:** In a small area of water surrounded by land	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
fishing spider **what it eats:** Water striders, predacious diving beetles **what eats it:** Green frogs, channel catfish, largemouth bass, common carp **environment:** Among plants on or near the bank of an enclosed body of fresh water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
giant floater mussel **what it eats:** Algae, water fleas **what eats it:** Muskrats, raccoons, red-eared slider turtles, great blue herons **environment:** Bottom of a small, deep body of water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
great blue heron **what it eats:** Bluegill fish, common carp, fathead minnows, young largemouth bass, green frogs, northern water snakes, red-eared slider turtles, giant floater mussels, pond snails, northern crayfish **what eats it:** Raccoons **environment:** Near bodies of water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
green darner dragonfly **what it eats:** **Adults eat**—blue-fronted dancer damselflies, yellow drake mayflies; **Nymphs eat**—predacious diving beetles, green frog tadpoles **what eats it:** **Adults eaten by**—green frogs; **Nymphs eaten by**—largemouth bass, predacious diving beetles, green frogs, red-eared slider turtles, northern harrier hawks, yellow garden spiders, fathead minnows **environment:** **Adults**—near a small, deep body of water; **Nymphs**—in the water	**Pond**, Forest, (Prairie) Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
green frog **what it eats:** **Adults eat**—blue-fronted dancer damselflies, green darner dragonflies, yellow drake mayflies, water striders, fishing spiders, predacious diving beetles, northern crayfish, fathead minnows, pond snails; **Tadpoles eat**—algae **what eats it:** Northern water snakes, common snapping turtles, largemouth bass, great blue herons, raccoons, muskrats, humans; **Tadpoles eaten by**—green darner dragonfly nymphs, predacious diving beetles **environment:** In algae and among aquatic plants	**Pond**, Forest, Prairie Producer, **Consumer** **Herbivore** (as tadpole), Omnivore, **Carnivore** (as adult), Decomposer, Scavenger **Prey**, **Predator**
human **what it eats:** Blackberries, bluegill fish, bobwhite quail, channel catfish, common carp, fox squirrels, green frogs, hickory nuts, largemouth bass, mallard ducks, muskrats, raccoons, white-tailed deer, wild turkeys, northern crayfish **what eats it:** None **environment:** Found in more than one ecosystem	**Pond**, **Forest**, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger Prey, **Predator**
largemouth bass **what it eats:** Bluegill fish, common carp, channel catfish, fathead minnows, northern crayfish, green frogs, water fleas, green darner dragonflies, fishing spiders, predacious diving beetles **what eats it:** Humans, great blue herons, raccoons, northern water snakes **environment:** In warm, clear water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
mallard duck **what it eats:** Duckweed, coontail, water primrose, common sedge, pin oak trees, water striders, yellow drake mayflies, blue-fronted dancer damselflies, pond snails, predacious diving beetles, northern crayfish **what eats it:** Humans, raccoons **environment:** In and around enclosed bodies of fresh water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
muskrat **what it eats:** Yellow water lilies, black willow trees, cattails, giant floater mussels, northern crayfish, green frogs **what eats it:** Humans **environment:** In and around enclosed bodies of water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
northern crayfish **what it eats:** Algae; **Decaying—**yellow water lilies, coontail, duckweed **what eats it:** Channel catfish, largemouth bass, bluegill fish, red-eared slider turtles, common snapping turtles, green frogs, northern water snakes, great blue herons, mallard ducks, raccoons, muskrats, humans **environment:** Bodies of open and enclosed water	**Pond**, Forest, Prairie Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, **Scavenger** **Prey**, Predator
northern water snake **what it eats:** Largemouth bass, bluegill fish, fathead minnows, northern crayfish, green frogs, common snapping turtles **what eats it:** Great blue herons, raccoons, red-eared slider turtles **environment:** In a small, deep body of water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
pin oak tree **what it eats:** Produces its own food using energy from the sun **what eats it:** **Acorns eaten by**—mallard ducks, raccoons, white-tailed deer; **Leaves and twigs eaten by**—white-tailed deer **environment:** Near enclosed and open bodies of water	**Pond**, (Forest), Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator

Organism	Key
pond snail **what it eats:** Algae **what eats it:** Common carp, green frogs, red-eared slider turtles, great blue herons, mallard ducks **environment:** In water surrounded by land	**Pond**, Forest, Prairie Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
predacious diving beetle **what it eats:** Nymphs of green darner dragonflies, blue-fronted dancer damselflies and yellow drake mayflies; Green frog tadpoles **what eats it:** Predacious diving beetles, fishing spiders, largemouth bass, green frogs, mallard ducks; **Eaten by nymphs of**—green darner dragonflies and blue-fronted dancer damselflies **environment:** Body of water surrounded by land	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
raccoon **what it eats:** Pin oak trees, northern crayfish, northern water snakes, fathead minnows, largemouth bass, green frogs, giant floater mussels, mallard ducks, common snapping turtles, red-eared slider turtles, great blue herons **what eats it:** Humans **environment:** Areas near enclosed bodies of water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
red-eared slider turtle **what it eats:** Water striders, pond snails, northern crayfish, giant floater mussels, duckweed, coontail, algae; Nymphs of green darner dragonflies, yellow drake mayflies and blue-fronted dancer damselflies **what eats it:** Raccoons, great blue herons; **Eggs and young eaten by**—northern water snakes **environment:** In and around an area of water surrounded by land	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
water flea **what it eats:** Algae, water fleas **what eats it:** Water fleas, water striders, blue-fronted dancer damselflies, yellow drake mayflies, giant floater mussels, young largemouth bass **environment:** Body of water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
water primrose **what it eats:** Produces its own food using energy from the sun **what eats it:** **Seeds eaten by**—white-tailed deer, mallard ducks **environment:** In an area of water surrounded by land	**Pond**, Forest, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
water strider **what it eats:** Water fleas **what eats it:** Green frogs, bluegill fish, fishing spiders, red-eared slider turtles, mallard ducks **environment:** Surface of a small area of water surrounded by land	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
white-tailed deer **what it eats:** White oak trees,Virginia creeper vines, mayapples, mosses, shelf mushrooms, flowering dogwood trees, sassafras trees, hickory trees, blue violets, redcedar trees, red maple trees, pin oak trees, black willow trees, little bluestem, big bluestem, switch grass, Indian grass, sideoats grama grass, prairie blazing star, purple coneflowers, gaura, compass plants, blackberries, water primrose **what eats it:** Humans, bobcats **environment:** Wooded areas	(Pond), **Forest**, (Prairie) Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
yellow drake mayfly **what it eats:** **Adults**—do not eat; **Nymphs eat**—water fleas, blue-fronted dancer damselfly nymphs, algae **what eats it:** **Adults eaten by**—mallard ducks, green frogs, green darner dragonflies; **Nymphs eaten by**—bluegill fish, predacious diving beetles, green frogs, red-eared slider turtles **environment:** In and near the water	**Pond**, Forest, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
yellow water lily **what it eats:** Produces its own food using energy from the sun **what eats it:** Muskrats, northern crayfish **environment:** Enclosed bodies of fresh water	**Pond**, Forest, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator

activity 5.2 : are there any "free" forest lunches?

estimated time
30–40 minutes

objectives
Students will be able to
1. Categorize consumers by what they eat.
2. Explain how herbivores, carnivores and omnivores are different.
3. Define the roles of decomposers in an ecosystem.
4. Classify decomposers and scavengers by the role they play in forest ecosystems.
5. Explain how an animal's teeth can help identify the kind of consumer it is.

teacher preparation
This is an outdoor activity and will require a large, open area. *Forest Ecosystem Cards* will be used to demonstrate how herbivores, carnivores and omnivores differ, not only in what they eat and the specialized tooth structures that help them eat, but also in the variety and availability of food sources.

Use only the *Forest Ecosystem Cards* for this activity, but *REMOVE THE HUMAN CARD*. The purpose of this activity is to reinforce each objective as well as give students an opportunity to explore food chains related specifically to a forest ecosystem.

NOTE: For quick teacher reference, each *Forest Ecosystem Card* is marked with two bars on the lower right corner.

materials
Science notebooks
Pencils
Thermometers
Flip chart or small white board and markers
*Forest Ecosystem Card*s (with Human card removed)
Forest Ecosystem Cards Teacher Key
Activity 5.2 Data Table/Bar Graph copies

procedure
1. Have students complete the heading in their science notebooks and take and record the outside air temperature.

2. Place the balls of yarn in the center of the open area. Shuffle and distribute one *Forest Ecosystem Card* randomly to each student. Make certain that a student has the Sun card.

3. After students have read their cards carefully, indicate a place where all the herbivores should stand together, where all the carnivores should stand together, and where all the omnivores should stand together. Have students in the "vore" groups check each other's cards to be sure everyone is sorted out correctly. Students with producer cards and the Sun card should remain apart from the "vore" groups.

4. Address the entire class:
   Q. Based on the organism on your card, raise your hand if you are a consumer.
   A. All but the producers and the sun should raise their hands.
   Q. What specialized structures do you have to help you consume/eat other organisms?
   A. Answers may vary, but students should note that each group of "vores" has different kinds of teeth.

5. Address the herbivores:
   Q. What kind of teeth do you have and why?
   A. Herbivores have snipping and grinding teeth because these teeth help them snip off and chew up plants.

6. Address the carnivores:

Q. What kind of teeth do you have and why?

A. Carnivores have sharp front teeth for gripping and tearing plus grinding teeth plus two sharp, pointed teeth on the sides of the front teeth for gripping and tearing. All of these teeth help carnivores grab, tear up and grind down the flesh and bones of animals.

7. Address the omnivores:

Q. What kind of teeth do you have and why?

A. Omnivores have teeth similar to both herbivores and carnivores because they eat plants and animals and need to grip, tear and grind both tough plants and the flesh and bones of animals.

8. Address the class:

Q. What about omnivores like white-breasted nuthatches and wild turkeys? What kind of specialized structure do they have to help them capture insects and eat seeds and fruit?

A. Omnivores like white-breasted nuthatches and wild turkeys have no teeth at all. Instead they have beaks that help them capture insects and eat seeds and fruits. Great horned owls are carnivores. They do not have teeth but use their sharp beaks for tearing apart their food.

9. Address the producers and the sun, by asking this "trick" question:

Q. Those of you left here, what kind of teeth do you have?

A. Producers do not eat other organisms, and therefore, have no tooth structures. Producers get energy directly from the sun to make their own food. The sun is the source of all energy and is not an organism.

10. Address the remaining consumers (scavengers and decomposers):

Q. What type of consumers are you?

A. Decomposers and scavengers.

Q. What is the difference between decomposers and scavengers?

A. Decomposers are special organisms (bacteria, fungi) that eat and break down scat, and dead plants and animals into tiny parts. Scavengers (earthworms, sowbugs, etc.) seek out and eat dead and decaying organisms.

11. Bring the student with the Sun card to the center of the open area near the balls of yarn and remind him/her of the important role he/she is about to play.

12. Address the entire class:

Q. Which organisms should be connected directly to the Sun?

A. Producers.

13. Have producers raise their hands, and choose one producer at a time to step forward. While the Sun is holding the end of a ball of yarn and unwinding it and handing it to the producer, ask:

Q. What organism are you?

A. Blue violet, moss, mayapple, etc.

Q. What role do you play in an ecosystem?

A. Producer.

Q. Why do you think you should connect to this food chain here?

A. I get energy to make my own food directly from the sun.

Q. In what ecosystem would you commonly be found?

A. Forest.

14. Continue linking producers to the Sun until they are either all linked *OR* until the Sun has used all the available balls of yarn. Have any unlinked producers stand over to the side.

Q. What might happen to a producer that does not receive enough sun, water, nutrients, etc.?

A. It might die.

Q. What happens to producers that die?

A. They begin to break down or decompose and eventually become part of the soil.

15. Indicate a place off to the side of the group as the place for unlinked/decomposing organisms. Ask students to give the place a name. The name could be funny/clever/etc. but should relate to decomposition (Ex: Decomp Hill; Soil Will Be Us; Break Down Dump).

Throughout this entire activity, send any students incorrectly attempting to link to a food chain (based on the information on their cards) to the decomposition area.

16. Repeat the process with consumers. Ask the consumers (who could be linked to one of the available producers linked to the Sun) to raise their hands. Choose students randomly and have them stand next to a producer they would consume. Ask each one:
    Q. What organism are you?
    A. Answers will vary but should include animals only.
    Q. What kind of consumer are you?
    A. Answers will vary but should include herbivores, omnivores, scavengers and decomposers only.
    Q. What role do you play in an ecosystem?
    A. Answers will vary. Depending on the specific organism, answers should include:
    - Consumers eat producers and other consumers and help to pass energy up through a food chain.
    - Herbivores eat producers and help to pass energy up through the food chain.
    - Omnivores eat producers and other consumers and help to pass energy up through the food chain.
    - Scavengers seek out and eat dead and decaying organisms and help to keep an ecosystem clean.
    - Decomposers eat and break down scat and dead and decaying plants and animals into tiny parts.

    Q. Why do you think you should connect to this food chain here?
    A. Answers will vary but should be based on information on their cards. (Ex: Because I am a consumer/herbivore/omnivore that consumes [names the particular plant to which they will connect] for energy; Because I am a scavenger/decomposer and I consume dead and decaying plants.This plant is dead and decaying.)

17. Have students unwind the ball of yarn as it is passed to the consumer. Enough yarn should be unwound to allow about two feet of space between them.The sun and all producers and consumers should continue to hold onto the piece of yarn.

18. Address any organisms remaining in the herbivore group:
    Q. What has happened to these herbivores?
    A. There are no producers left for them to eat.
    Q. What could happen to them?
    A. These herbivores would either starve or move away (if possible) to find producers somewhere else.
    Q. Where should we place them now?
    A. In the decomposition area!

19. If a decomposer has linked to a producer (which is possible):
    Q. What is happening to a food chain that includes the sun, a producer, and a decomposer?
    A. The producer has died, and the decomposer is breaking it down into tiny parts.
    Q. Would it be the end of a food chain if a decomposer linked up with a decaying plant?
    A. Not necessarily. If a sowbug (considered a decomposer and a scavenger) linked with a "decaying" producer, there are other consumers that could still consume (link up with) the sowbug.

20. Continue the process with the remaining consumers. Ask students who think they could link with one of the food chains to raise their hands. Choose students randomly and repeat the questions for each student as they step up to their chosen chain and unwind and pass along the ball of yarn.
    Q. What organism are you?
    A. Answers will vary but should include animals, scavengers and decomposers only.
    Q. What kind of consumer are you?
    A. Answers will vary but should include carnivores, omnivores, scavengers and decomposers only.
    Q. What role do you play in an ecosystem?
    A. Answers will vary. Depending on the specific organism, answers should include:
    - Consumers eat producers and other consumers and help to pass energy up through a food chain.
    - Carnivores eat other consumers and help to pass energy up through the food chain.
    - Omnivores eat producers and other consumers and help to pass energy up through the food chain.
    - Scavengers seek out and eat dead and decaying organisms and help to keep an ecosystem clean.
    - Decomposers eat and break down scat and dead and decaying plants and animals into tiny parts.

    Q. Why do you think you should connect to this food chain here?

A. Answers will vary but should be based on information on their cards. (Ex: Because I am a consumer/carnivore /omnivore that consumes [names the particular animal to which they will connect] for energy; Because I am a scavenger/decomposer and I consume dead and decaying animals. This animal is dead and decaying.)

21. Repeat the process, asking for students to step up as part of the next link in one of the food chains. Students from this point on should be carnivores, omnivores, scavengers or decomposers only but must reference the information on their card to prove that they would eat the organism to which they plan to link.

    Continue until all students are linked to a food chain or unlinked students/consumers have no place to connect. Send unlinked students to the decomposition area.

22. Use a flip chart or small white board to capture the following information for all food chains. Have students use the data table provided to organize the information.
    Q. How many producers?
    Q. How many herbivores?
    Q. How many carnivores?
    Q. How many omnivores?
    Q. How many decomposers and scavengers?
    Q. How many decomposing organisms left at the decomposition area?

    Q. Who or what is going to clean up all those decomposing organisms?
    A. Other decomposers (fungi and bacteria) and scavengers (earthworms, sowbugs, etc.).

23. Have students roll up the balls of yarn and place them in the center of the open area. Collect and redistribute the cards randomly. **Instruct students to create new food chains on their own for their forest ecosystem.** This could create something close to chaos as students read their cards, find the Sun, question each other and attempt to link with a food chain. Students who think they cannot connect into any of the chains should move to the decomposition area.

24. Quickly review and discuss each component of each food chain. (If students are confident in their understanding of the concepts, have them attempt these food chain reviews in "speed talk.") Send any students linked incorrectly to the decomposition area, and randomly select a student already in the decomposition area and see if he/she can connect somewhere in one of the chains without jeopardizing a student already in place.

25. Record the number of each type of organism linked somewhere in the food chains and include those numbers as a second set on the flip chart/white board. Have students record this data in their *Data Tables*.

26. Using data from their *Data Tables*, have students work in groups to use the graph provided to create a bar graph.

27. Have students at their graph to answer the following:
    Q. Which type of organism had the highest number?
    Q. Which type of organism had the lowest number?
    Q. What did you notice about the numbers of these organisms?
    A. Answers will vary. There are more producers. There are more omnivores than herbivores or carnivores. There are many decomposing organisms, etc.
    Q. How would you explain this?
    A. Answers will vary. As long as there is sunlight, air, water, nutrients, space and temperature, producers will grow. Omnivores have more choices and are able to eat a larger variety of food. Basically, there really are no free lunches, and even omnivores sometimes have difficulty finding food. However, there were always students "decomposing" and returning nutrients back into the soil.

28. Have students revisit their *Big Chart: Forest Ecosystem* and place an X or a check mark indicating whether each organism listed is an herbivore, carnivore, omnivore, decomposer or scavenger.

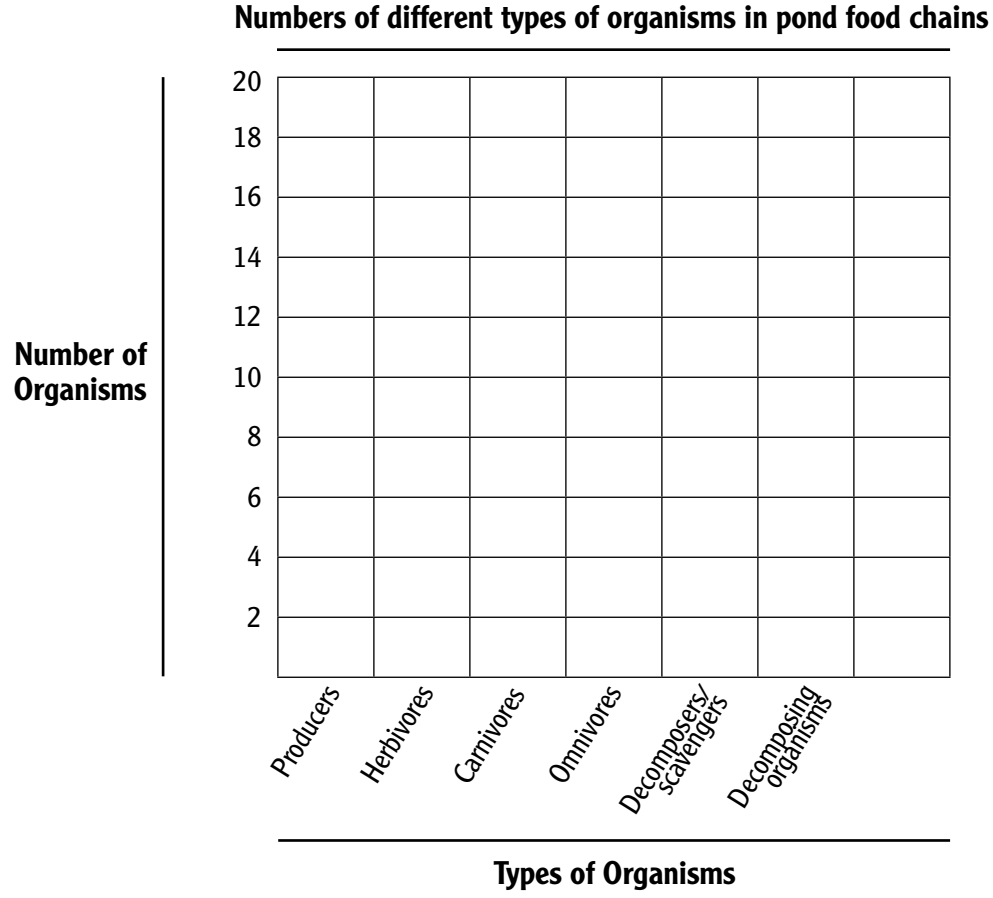
Wrap-up/formative assessment See *Wrap-Up/Formative Assessments* in the Teacher Notes section of the introductory material to choose a strategy that meets student needs.

forest ecosystem data table

Kinds of organisms	Number of organisms in 1st set of pond food chains	Number of organisms in 2nd set of pond food chains	Total
Producers			
Herbivores			
Carnivores			
Omnivores			
Decomposers & scavengers			
Decomposing organisms			

forest ecosystem graph

Complete a bar graph below using the information from the Total column in your data table.



badger

what it eats: Thirteen-lined ground squirrels, northern crawfish frogs, ornate box turtles, three-toed box turtles, plains pocket gophers

what eats it: Young eaten by coyotes

environment: Grasslands

bobcat

what it eats: White-tailed deer, ovenbirds, wild turkeys, black rat snakes

what eats it: **Young eaten by**—Great horned owls, coyotes

environment: Bottomland with lots of trees

black rat snake

what it eats: Gray treefrogs, rough green snakes, tiger salamanders, ovenbirds, white-breasted nuthatches, fox squirrels; **Eggs and nestlings of**—pileated woodpeckers, ovenbirds, white-breasted nuthatches, great horned owls

what eats it: Great horned owls, bobcats

environment: In an area with many trees

carpenter ant

what it eats: **Living and dead**—termites and sowbugs

what eats it: Pileated woodpeckers, ovenbirds, centipedes, gray tree frogs; **Tiny pieces of dead and decaying carpenter ants eaten by**—earthworms

environment: Dead trees and logs

blue violet

what it eats: Produces its own food using energy from the sun

what eats it: Three-toed box turtles, io moths, woodland voles, white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs

environment: In an area with many trees

centipede

what it eats: Sowbugs, centipedes, termites, carpenter ants

what eats it: Centipedes, tiger salamanders, ovenbirds

environment: Land with many trees

earthworm

what it eats: **Tiny pieces of dead and decaying**—hickory trees, blue violets, mayapples, flowering dogwood trees, sassafras trees, redcedar trees, red maple trees,Virginia creeper vines, white oak trees, sowbugs, carpenter ants and termites

what eats it: Ovenbirds, three-toed box turtles, tiger salamanders

environment: In areas with lots of trees and other plants

gray treefrog

what it eats: Walking sticks, termites, carpenter ants

what eats it: Black rat snakes

environment: Areas with many trees

flowering dogwood tree

what it eats: Produces its own food using energy from the sun

what eats it: **Fruit eaten by**—fox squirrels, white-tailed deer, wild turkeys, white-breasted nuthatches; **Seeds eaten by**—carpenter ants; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—termites

environment: Under larger trees

great horned owl

what it eats: Fox squirrels, bobcats, thirteen-lined ground squirrels, spotted skunks, woodland voles, northern harrier hawks, ovenbirds, white-breasted nuthatches, wild turkeys, black rat snakes, speckled kingsnakes

what eats it: Black rat snakes

environment: Areas with many trees

fox squirrel

what it eats: Virginia creeper vines, flowering dogwood trees, white oak trees, hickory trees, red maple trees

what eats it: Great horned owls, black rat snakes, humans

environment: Cavities of oak, hickory and other hardwood trees

hickory tree

what it eats: Produces its own food using energy from the sun

what eats it: **Nuts eaten by**—humans, wild turkeys; **Nuts and buds eaten by**—fox squirrels, white-tailed deer; **Leaves eaten by**—walking sticks, white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—termites

environment: In an area with many trees

human

what it eats: Blackberries, bluegill fish, bobwhite quail, channel catfish, common carp, fox squirrels, green frogs, hickory nuts, largemouth bass, mallard ducks, muskrats, raccoons, white-tailed deer, wild turkeys, northern crayfish

what eats it: None

environment: Found in more than one ecosystem

moss

what it eats: Produces its own food using energy from the sun

what eats it: White-tailed deer

environment: In shaded areas under trees

io moth

what it eats: **Adults**—do not feed; **Larva eat leaves of**—blue violets, sassafras trees, oak trees

what eats it: Pileated woodpeckers, white-breasted nuthatches, rough green snakes

environment: Land with many trees

ovenbird

what it eats: Earthworms, centipedes, sowbugs, carpenter ants, termites

what eats it: Great horned owls, bobcats, black rat snakes

environment: In an area with many trees

mayapple

what it eats: Produces its own food using energy from the sun

what eats it: **Fruit eaten by**—three-toed box turtles, wild turkeys, woodland voles; **Fruit and leaves eaten by**—white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs

environment: Areas with many trees

pileated woodpecker

what it eats: Virginia creeper vines, walking sticks, carpenter ants, io moths, spicebush swallowtail butterflies, termites, white oak trees, redcedar trees, blackberries

what eats it: Black rat snakes

environment: Areas with many trees

red maple tree

what it eats: Produces its own food using energy from the sun

what eats it: **Seeds eaten by**—white-breasted nuthatches, wild turkeys, fox squirrels, woodland voles; **Leaves eaten by**—white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—shelf mushrooms, termites

environment: In areas with many trees

sassafras tree

what it eats: Produces its own food using energy from the sun

what eats it: **Fruit eaten by**—white-tailed deer, white-breasted nuthatches; **Leaves eaten by**—io moths, spicebush swallowtail butterflies, white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—termites

environment: Areas with lots of trees

redcedar tree

what it eats: Produces its own food using energy from the sun

what eats it: **Berries eaten by**—white-tailed deer, pileated woodpeckers, white-breasted nuthatches; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—termites

environment: Areas with lots of trees

shelf mushroom

what it eats: **Dead and decaying**—white oak trees, hickory trees, red maple trees

what eats it: White-tailed deer

environment: In areas with many trees

rough green snake

what it eats: Spicebush swallowtail butterflies, io moths, termites, walking sticks

what eats it: Black rat snakes

environment: Areas with many trees

sowbug

what it eats: **Dead and decaying**—hickory trees, blue violets, white oak trees, sassafras trees, redcedar trees, red maple trees,Virginia creeper vines, mayapples, flowering dogwood trees

what eats it: Centipedes, tiger salamanders, ovenbirds, wild turkeys, carpenter ants; **Tiny pieces of dead and decayed sowbugs eaten by**—earthworms

environment: In damp areas with many trees under logs and rocks

spicebush swallowtail butterfly

what it eats: Sassafras trees

what eats it: Pileated woodpeckers, rough green snakes

environment: Areas with lots of trees

tiger salamander

what it eats: Earthworms, centipedes, sowbugs

what eats it: Black rat snakes, great horned owls, wild turkeys

environment: Where there are many trees

termite

what it eats: **Dead and decaying wood from**—flowering dogwood trees, hickory trees, red maple trees, redcedar trees, sassafras trees, white oak trees

what eats it: Gray tree frogs, pileated woodpeckers, white-breasted nuthatches, ovenbirds, carpenter ants, centipedes, rough green snakes; **Tiny pieces of dead and decayed termites eaten by**—earthworms

environment: Where there are many trees

virginia creeper vine

what it eats: Produces its own food using energy from the sun

what eats it: **Berries eaten by**—white-breasted nuthatches, pileated woodpeckers, fox squirrels; **Leaves eaten by**—white-tailed deer, wild turkeys; **Dead leaves eaten by**—earthworms, sowbugs

environment: Areas with trees

three-toed box turtle

what it eats: Blue violets, mayapples, earthworms

what eats it: Badgers

environment: In areas with many trees

walking stick

what it eats: White oak trees, hickory trees

what eats it: Wild turkeys, pileated woodpeckers, white-breasted nuthatches, rough green snakes, gray treefrogs

environment: Areas with many trees

white oak tree

what it eats: Produces its own food using energy from the sun

what eats it: **Leaves eaten by**—walking sticks; **Dead leaves eaten by**—earthworms, sowbugs; **Acorns eaten by**—fox squirrels, wild turkeys, pileated woodpeckers; **Acorns and leaves eaten by**—white-tailed deer; **Dead wood eaten by**—shelf mushrooms, termites

environment: Land where many trees grow

wild turkey

what it eats: Walking sticks, sowbugs, tiger salamanders, mayapples, red maple trees, white oak trees, hickory trees, flowering dogwood trees, Virginia creeper vines

what eats it: Humans, great horned owls, bobcats

environment: In an area with many trees

white-breasted nuthatch

what it eats: Termites, walking sticks, io moths, red maple trees, redcedar trees, flowering dogwood trees, sassafras trees, virginia creeper vines

what eats it: Great horned owls, black rat snakes

environment: Areas with many trees

woodland vole

what it eats: Mayapples, blue violets, red maple trees

what eats it: Great horned owls

environment: In an area with many trees

white-tailed deer

what it eats: White oak trees,Virginia creeper vines, mayapples, mosses, shelf mushrooms, flowering dogwood trees, sassafras trees, hickory trees, blue violets, redcedar trees, red maple trees, pin oak trees, black willow trees, little bluestem, big bluestem, switch grass, Indian grass, sideoats grama grass, prairie blazing star, purple coneflowers, gaura, compass plants, blackberries, water primrose

what eats it: Humans, bobcats

environment: Wooded areas

sun

Organism	Key
badger **what it eats:** Thirteen-lined ground squirrels, northern crawfish frogs, ornate box turtles, three-toed box turtles, plains pocket gophers **what eats it:** Young eaten by coyotes **environment:** Grasslands	Pond, [Forest], **Prairie** Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
black rat snake **what it eats:** Gray treefrogs, rough green snakes, tiger salamanders, ovenbirds, white-breasted nuthatches, fox squirrels; **Eggs and nestlings of**—pileated woodpeckers, ovenbirds, white-breasted nuthatches, great horned owls **what eats it:** Great horned owls, bobcats **environment:** In an area with many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
blue violet **what it eats:** Produces its own food using energy from the sun **what eats it:** Three-toed box turtles, io moths, woodland voles, white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs **environment:** In an area with many trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
bobcat **what it eats:** White-tailed deer, ovenbirds, wild turkeys, black rat snakes **what eats it:** **Young eaten by**—Great horned owls, coyotes **environment:** Bottomland with lots of trees	Pond, **Forest**, [Prairie] Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
carpenter ant **what it eats:** **Living and dead**—termites and sowbugs **what eats it:** Pileated woodpeckers, ovenbirds, centipedes, gray tree frogs; **Tiny pieces of dead and decaying carpenter ants eaten by**—earthworms **environment:** Dead trees and logs	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, **Decomposer**, **Scavenger** **Prey**, **Predator**

Organism	Key
centipede **what it eats:** Sowbugs, centipedes, termites, carpenter ants **what eats it:** Centipedes, tiger salamanders, ovenbirds **environment:** Land with many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
earthworm **what it eats:** **Tiny pieces of dead and decaying**—hickory trees, blue violets, mayapples, flowering dogwood trees, sassafras trees, redcedar trees, red maple trees,Virginia creeper vines, white oak trees, sowbugs, carpenter ants and termites **what eats it:** Ovenbirds, three-toed box turtles, tiger salamanders **environment:** In areas with lots of trees and other plants	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, Carnivore, **Decomposer**, **Scavenger** **Prey**, Predator
flowering dogwood tree **what it eats:** Produces its own food using energy from the sun **what eats it:** **Fruit eaten by**—fox squirrels, white-tailed deer, wild turkeys, white-breasted nuthatches; **Seeds eaten by**—carpenter ants; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—termites **environment:** Under larger trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
fox squirrel **what it eats:** Virginia creeper vines, flowering dogwood trees, white oak trees, hickory trees, red maple trees **what eats it:** Great horned owls, black rat snakes, humans **environment:** Cavities of oak, hickory and other hardwood trees	Pond, **Forest**, Prairie Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
gray treefrog **what it eats:** Walking sticks, termites, carpenter ants **what eats it:** Black rat snakes **environment:** Areas with many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
great horned owl **what it eats:** Fox squirrels, bobcats, thirteen-lined ground squirrels, spotted skunks, woodland voles, northern harrier hawks, ovenbirds, white-breasted nuthatches, wild turkeys, black rat snakes, speckled kingsnakes **what eats it:** Black rat snakes **environment:** Areas with many trees	Pond, **Forest**, [Prairie] Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
hickory tree **what it eats:** Produces its own food using energy from the sun **what eats it:** **Nuts eaten by**—humans, wild turkeys; **Nuts and buds eaten by**—fox squirrels, white-tailed deer; **Leaves eaten by**—walking sticks, white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—termites **environment:** In an area with many trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
human **what it eats:** Blackberries, bluegill fish, bobwhite quail, channel catfish, common carp, fox squirrels, green frogs, hickory nuts, largemouth bass, mallard ducks, muskrats, raccoons, white-tailed deer, wild turkeys, northern crayfish **what eats it:** None **environment:** Found in more than one ecosystem	**Pond**, **Forest**, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger Prey, **Predator**
io moth **what it eats:** **Adults**—do not feed; **Larva eat leaves of**—blue violets, sassafras trees, oak trees **what eats it:** Pileated woodpeckers, white-breasted nuthatches, rough green snakes **environment:** Land with many trees	Pond, **Forest**, Prairie Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
mayapple **what it eats:** Produces its own food using energy from the sun **what eats it:** **Fruit eaten by**—three-toed box turtles, wild turkeys, woodland voles; **Fruit and leaves eaten by**—white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs **environment:** Areas with many trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator

Organism	Key
moss **what it eats:** Produces its own food using energy from the sun **what eats it:** White-tailed deer **environment:** In shaded areas under trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
ovenbird **what it eats:** Earthworms, centipedes, sowbugs, carpenter ants, termites **what eats it:** Great horned owls, bobcats, black rat snakes **environment:** In an area with many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
pileated woodpecker **what it eats:** Virginia creeper vines, walking sticks, carpenter ants, io moths, spicebush swallowtail butterflies, termites, white oak trees, redcedar trees, blackberries **what eats it:** Black rat snakes **environment:** Areas with many trees	Pond, **Forest**, (Prairie) Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
red maple tree **what it eats:** Produces its own food using energy from the sun **what eats it:** **Seeds eaten by**—white-breasted nuthatches, wild turkeys, fox squirrels, woodland voles; **Leaves eaten by**—white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—shelf mushrooms, termites **environment:** In areas with many trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
redcedar tree **what it eats:** Produces its own food using energy from the sun **what eats it:** **Berries eaten by**—white-tailed deer, pileated woodpeckers, white-breasted nuthatches; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—termites **environment:** Areas with lots of trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator

Organism	Key
rough green snake **what it eats:** Spicebush swallowtail butterflies, io moths, termites, walking sticks **what eats it:** Black rat snakes **environment:** Areas with many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
sassafras tree **what it eats:** Produces its own food using energy from the sun **what eats it:** **Fruit eaten by**—white-tailed deer, white-breasted nuthatches; **Leaves eaten by**—io moths, spicebush swallowtail butterflies, white-tailed deer; **Dead leaves eaten by**—earthworms, sowbugs; **Dead wood eaten by**—termites **environment:** Areas with lots of trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
shelf mushroom **what it eats:** **Dead and decaying**—white oak trees, hickory trees, red maple trees **what eats it:** White-tailed deer **environment:** In areas with many trees	Pond, **Forest**, Prairie Producer, Consumer **[Fungi belong to an entirely different category of organisms.]** Herbivore, Omnivore, Carnivore, **Decomposer**, Scavenger Prey, Predator
sowbug **what it eats:** **Dead and decaying**—hickory trees, blue violets, white oak trees, sassafras trees, redcedar trees, red maple trees,Virginia creeper vines, mayapples, flowering dogwood trees **what eats it:** Centipedes, tiger salamanders, ovenbirds, wild turkeys, carpenter ants; **Tiny pieces of dead and decayed sowbugs eaten by**—earthworms **environment:** In damp areas with many trees under logs and rocks	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, Carnivore, **Decomposer**, **Scavenger** **Prey**, Predator
spicebush swallowtail butterfly **what it eats:** Sassafras trees **what eats it:** Pileated woodpeckers, rough green snakes **environment:** Areas with lots of trees	Pond, **Forest**, Prairie Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator

Organism	Key
termite **what it eats:** **Dead and decaying wood from**—flowering dogwood trees, hickory trees, red maple trees, redcedar trees, sassafras trees, white oak trees **what eats it:** Gray tree frogs, pileated woodpeckers, white-breasted nuthatches, ovenbirds, carpenter ants, centipedes, rough green snakes; **Tiny pieces of dead and decayed termites eaten by**—earthworms **environment:** Where there are many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, Carnivore, **Decomposer**, Scavenger **Prey**, Predator
three-toed box turtle **what it eats:** Blue violets, mayapples, earthworms **what eats it:** Badgers **environment:** In areas with many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
tiger salamander **what it eats:** Earthworms, centipedes, sowbugs **what eats it:** Black rat snakes, great horned owls, wild turkeys **environment:** Where there are many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
virginia creeper vine **what it eats:** Produces its own food using energy from the sun **what eats it:** **Berries eaten by**—white-breasted nuthatches, pileated woodpeckers, fox squirrels; **Leaves eaten by**—white-tailed deer, wild turkeys; **Dead leaves eaten by**—earthworms, sowbugs **environment:** Areas with trees	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
walking stick **what it eats:** White oak trees, hickory trees **what eats it:** Wild turkeys, pileated woodpeckers, white-breasted nuthatches, rough green snakes, gray treefrogs **environment:** Areas with many trees	Pond, **Forest**, Prairie Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator

Organism	Key
white oak tree **what it eats:** Produces its own food using energy from the sun **what eats it:** **Leaves eaten by**—walking sticks; **Dead leaves eaten by**—earthworms, sowbugs; **Acorns eaten by**—fox squirrels, wild turkeys, pileated woodpeckers; **Acorns and leaves eaten by**—white-tailed deer; **Dead wood eaten by**—shelf mushrooms, termites **environment:** Land where many trees grow	Pond, **Forest**, Prairie **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
white-breasted nuthatch **what it eats:** Termites, walking sticks, io moths, red maple trees, redcedar trees, flowering dogwood trees, sassafras trees, virginia creeper vines **what eats it:** Great horned owls, black rat snakes **environment:** Areas with many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
white-tailed deer **what it eats:** White oak trees,Virginia creeper vines, mayapples, mosses, shelf mushrooms, flowering dogwood trees, sassafras trees, hickory trees, blue violets, redcedar trees, red maple trees, pin oak trees, black willow trees, little bluestem, big bluestem, switch grass, Indian grass, sideoats grama grass, prairie blazing star, purple coneflowers, gaura, compass plants, blackberries, water primrose **what eats it:** Humans, bobcats **environment:** Wooded areas	(Pond), **Forest**, (Prairie) Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
wild turkey **what it eats:** Walking sticks, sowbugs, tiger salamanders, mayapples, red maple trees, white oak trees, hickory trees, flowering dogwood trees, Virginia creeper vines **what eats it:** Humans, great horned owls, bobcats **environment:** In an area with many trees	Pond, **Forest**, Prairie Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
woodland vole **what it eats:** Mayapples, blue violets, red maple trees **what eats it:** Great horned owls **environment:** In an area with many trees	Pond, **Forest**, Prairie Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator

activity 5.3 : are there any "free" prairie lunches?

estimated time
30–40 minutes

objectives
Students will be able to
1. Categorize consumers by what they eat.
2. Explain how herbivores, carnivores and omnivores are different.
3. Define the roles of decomposers in an ecosystem.
4. Classify decomposers and scavengers by the role they play in prairie ecosystems.
5. Explain how an animal's teeth can help identify the kind of consumer it is.

teacher preparation
This is an outdoor activity and will require a large, open area. *Prairie Ecosystem Cards* will be used to demonstrate how herbivores, carnivores and omnivores differ, not only in what they eat and the specialized tooth structures that help them eat, but also in the variety and availability of food sources.

Use only the *Prairie Ecosystem Cards* for this session, but *REMOVE THE HUMAN CARD*. This purpose of this activity is to reinforce each objective as well as give students an opportunity to explore food chains related specifically to a prairie ecosystem.

NOTE: For quick teacher reference, each *Prairie Ecosystem Card* is marked with three bars on the lower right corner.

materials
Science notebooks
Pencils
Thermometers
Flip chart or small white board and markers
*Prairie Ecosystem Card*s (with Human card removed)
Prairie Ecosystem Cards Teacher Key
Activity 5.3 Data Table/Bar Graph copies

procedure
1. Have students complete the heading in their science notebooks and take and record the outside air temperature.

2. Place the balls of yarn in the center of the open area. Shuffle and distribute one *Prairie Ecosystem Card* randomly to each student. Make certain that a student has the Sun card.

3. After students have read their cards carefully, indicate a place where all the herbivores should stand together, where all the carnivores should stand together, and where all the omnivores should stand together. Have students in the "vore" groups check each other's cards to be sure everyone is sorted out correctly. Students with producer cards and the Sun card should remain apart from the "vore" groups.

[Numbers 4 through 8 below repeat the procedure in *Activity 5.2* regarding teeth as specialized structures, but this activity deals with prairie animals specifically. Repeat numbers 4 through 8 with emphasis on prairie consumers for students who would benefit from reinforcement or review the concept in a prairie context briefly for students who have grasped the concept after completing *Activity 5.1*.]

4. Addressing the entire class:
   Q. Based on the organism on your card, raise your hand if you are a consumer.
   A. All but the producers and the sun should raise their hands.
   Q. What specialized structures do you have to help you consume/eat other organisms?
   A. Answers may vary, but students should note that each group of "vores" has different kinds of teeth.

5. Address the herbivores:
   Q. What kind of teeth do you have and why?
   A. Herbivores have snipping and grinding teeth because these teeth help them snip off and chew up plants.

6. Address the carnivores:
   Q. What kind of teeth do you have and why?
   A. Carnivores have sharp front teeth for gripping and tearing plus grinding teeth plus two sharp, pointed teeth on the sides of the front teeth for gripping and tearing. All of these teeth help carnivores grab, tear up and grind down the flesh and bones of animals.

7. Address the omnivores:
   Q. What kind of teeth do you have and why?
   A. Omnivores have teeth similar to both herbivores and carnivores because they eat plants and animals and need to grip, tear and grind both tough plants and the flesh and bones of animals.

8. Address the class:
   Q. What about omnivores like bobolinks and grasshopper sparrows? What kind of specialized structure do they have to help them capture insects and eat seeds and fruit?
   A. Omnivores like bobolinks and grasshopper sparrows have no teeth at all. Instead they have beaks that help them capture insects and eat seeds and fruits. Great horned owls and northern harrier hawks are carnivores. They do not have teeth but they do use their sharp beaks for tearing apart their food.

9. Address the producers and the sun and ask this "trick" question:
   Q. Those of you left here, what kind of teeth do you have?
   A. Producers do not eat other organisms, and therefore, have no tooth structures. Producers get energy directly from the sun to make their own food. The sun is the source of all energy and is not an organism.

10. Address the remaining consumers (scavengers and decomposers):
    Q. What type of consumers are you?
    A. Decomposers and scavengers.
    Q. What is the difference between decomposers and scavengers?
    A. Decomposers are special organisms (bacteria, fungi) that eat and break down scat, and dead plants and animals into tiny parts. Scavengers (earthworms, vultures, grassland crayfish, etc.) seek out and eat dead and decaying organisms.

11. Bring the student with the Sun card to the center of the open area near the balls of yarn and remind him/her of the important role he/she is about to play.

12. Address the entire class:
    Q. Which organisms should be connected directly to the Sun?
    A. Producers.

13. Have producers raise their hands, and choose one producer at a time to step forward. While the Sun is holding the end of a ball of yarn and unwinding it and handing it to the producer, ask:
    Q. What organism are you?
    A. Big bluestem, prairie blazing star, Indian grass, etc.
    Q. What role do you play in an ecosystem?
    A. Producer.
    Q. Why do you think you should connect to this food chain here?
    A. I get energy to make my own food directly from the sun.
    Q. In what ecosystem would you commonly be found?
    A. Prairie.

14. Continue linking producers to the Sun until they are either all linked *OR* until the Sun has used all the available balls of yarn. Have any unlinked producers stand over to the side.
    Q. What might happen to a producer that does not receive enough sun, water, nutrients, etc.?
    A. It might die.
    Q. What happens to producers that die?
    A. They begin to break down or decompose and eventually become part of the soil.

15. Indicate a place off to the side of the group as the place for unlinked/decomposing organisms. Ask students to give the place a name. The name could be funny/clever/etc. but should relate to decomposition (Ex: Decomp Hill; Soil Will Be Us; Break Down Dump).

    Throughout this entire activity, send any students incorrectly (based on the information on their cards) attempting to link to a food chain to the decomposition area.

16. Repeat the process with consumers. Ask the consumers (who could be linked to one of the available producers linked to the Sun) to raise their hands. Choose students randomly and have them stand next to a producer they would consume. Ask each one:
    Q. What organism are you?
    A. Answers will vary but should include animals only.
    Q. What kind of consumer are you?
    A. Answers will vary but should include herbivores, omnivores, scavengers and decomposers only.
    Q. What role do you play in an ecosystem?
    A. Answers will vary. Depending on the specific organism, answers should include:
    - Consumers eat producers and other consumers and help to pass energy up through a food chain.
    - Herbivores eat producers and help to pass energy up through the food chain.
    - Omnivores eat producers and other consumers and help to pass energy up through the food chain.
    - Scavengers seek out and eat dead and decaying organisms and help to keep an ecosystem clean.
    - Decomposers eat and break down scat and dead and decaying plants and animals into tiny parts.

    Q. Why do you think you should connect to this food chain here?
    A. Answers will vary but should be based on information on their cards. (Ex: Because I am a consumer/herbivore/omnivore that consumes [names the particular plant to which they will connect] for energy; Because I am a scavenger/decomposer and I consume dead and decaying plants. This plant is dead and decaying.)

17. Have students unwind the ball of yarn as it is passed to the consumer. Enough yarn should be unwound to allow about two feet of space between them. The sun and all producers and consumers should continue to hold onto the piece of yarn.

18. Addressing any organisms remaining in the herbivore group:
    Q. What has happened to these herbivores?
    A. There are no producers left for them to eat.
    Q. What could happen to them?
    A. These herbivores would either starve or move away (if possible) to find producers somewhere else.
    Q. Where should we place them now?
    A. In the decomposition area!

19. If a decomposer has linked to a producer (which is possible):
    Q. What happens to a food chain that includes the sun, a producer, and a decomposer?
    A. The producer has died, and the decomposer is breaking it down into tiny parts which would be the "end" of that particular food chain.
    Q. Would it be the end of a food chain here if decomposer or scavenger had linked up with a decaying plant?
    A. Not necessarily. If a grassland crayfish (considered a decomposer and scavenger) linked with a "decaying" producer, there are carnivores that could still consume (link up with) the grassland crayfish.

20. Continue the process with the remaining consumers. Ask students who think they could link with one of the food chains to raise their hands. Choose students randomly and repeat the questions for each student as they step up to their chosen chain and unwind and pass along the ball of yarn.
    Q. What organism are you?
    A. Answers will vary but should include animals, scavengers and decomposers only.
    Q. What kind of consumer are you?
    A. Answers will vary but should include carnivores, omnivores, scavengers and decomposers only.
    Q. What role do you play in an ecosystem?
    A. Answers will vary. Depending on the specific organism, answers should include:
    - Consumers eat producers and other consumers and help to pass energy up through a food chain.
    - Carnivores eat other consumers and help to pass energy up through the food chain.
    - Omnivores eat producers and other consumers and help to pass energy up through the food chain.
    - Scavengers seek out and eat dead and decaying organisms and help to keep an ecosystem clean.
    - Decomposers eat and break down scat and dead and decaying plants and animals into tiny parts.

    Q. Why do you think you should connect to this food chain here?
    A. Answers will vary but should be based on information on their cards. (Ex: Because I am a consumer/carnivore /omnivore that consumes [names the particular animal to which they will connect] for energy; Because I am a scavenger/decomposer and I consume dead and decaying animals. This animal is dead and decaying.)

21. Repeat the process, asking for students to step up as part of the next link in one of the food chains. Students from this point on should be carnivores, omnivores, scavengers or decomposers only but must prove by referencing the information on their card that they would eat the organism to which they plan to link.

    Continue until all students are linked to a food chain or unlinked students/consumers have no place to connect. Send unlinked students to the decomposition area.

22. Use a flip chart or small white board to capture the following information for all food chains. Have students use the data table provided to organize the information.
    Q. How many producers?
    Q. How many herbivores?
    Q. How many carnivores?
    Q. How many omnivores?
    Q. How many decomposers and scavengers?
    Q. How many decomposing organisms left at the decomposition area?

    Q. Who or what is going to clean up all those decomposing organisms?
    A. Other decomposers (fungi and bacteria) and scavengers (insects, earthworms, grassland crayfish, etc.).

23. Have students roll up the balls of yarn and place them in the center of the open area. Collect and redistribute the cards randomly. Instruct students to create new food chains on their own for their prairie ecosystem. This could create something close to chaos as students read their cards, find the Sun, question each other and attempt to link with a food chain. Students who think they cannot connect into any of the chains should move to the decomposition area.

24. Quickly review and discuss each component of each food chain. (If students are confident in their understanding of the concepts, have them attempt these food chain reviews in "speed talk.") Send any students linked incorrectly to the decomposition area, and randomly select a student already in the decomposition area and see if he/she can connect somewhere in one of the chains without jeopardizing a student already in place.

25. Record the number of each type of organism linked somewhere in the food chains and include those numbers as a second set on the flip chart/white board. Have students record this data in their *Data Tables*.

26. Using data from their *Data Tables*, have students work in groups to use the graph provided to create a bar graph.

27. Have students look at their graphs to answer the following:
    Q. Which type of organism had the highest number?
    Q. Which type of organism had the lowest number?
    Q. What did you notice about the numbers of these organisms?
    A. Answers will vary. There are more producers. There are more omnivores than herbivores or carnivores. There are many decomposing organisms, etc.
    Q. How would you explain this?
    A. Answers will vary. As long as there is sunlight, air, water, nutrients, space and temperature, producers will grow. Omnivores have more choices and are able to eat a larger variety of food. Basically, there really are no free lunches, and even omnivores sometimes have difficulty finding food. However, there were always students "decomposing" and returning nutrients back into the soil.

28. Have students revisit their *Big Chart: Prairie Ecosystem* and place an X or a check mark indicating whether each organism listed is an herbivore, carnivore, omnivore, decomposer or scavenger.

Wrap-up/formative assessment

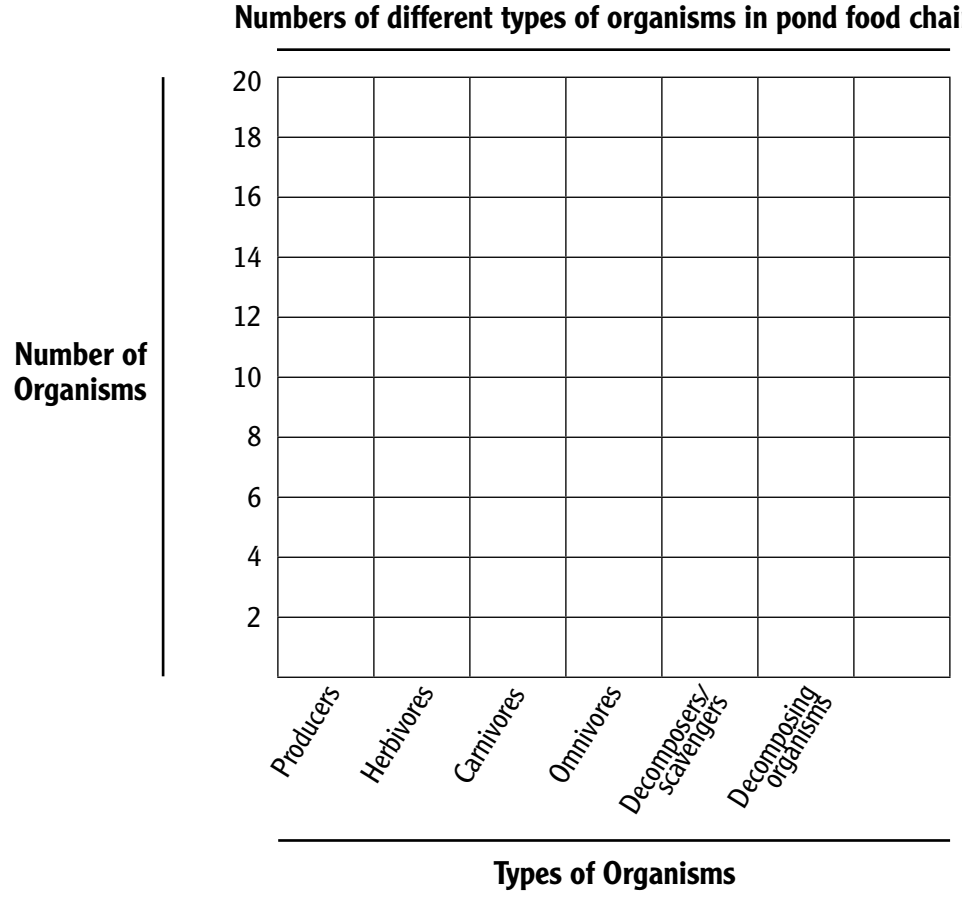
See *Wrap-Up/Formative Assessments* in the Teacher Notes section of the introductory material to choose a strategy that meets student needs.

prairie ecosystem data table

Kinds of organisms	Number of organisms in 1st set of pond food chains	Number of organisms in 2nd set of pond food chains	Total
Producers			
Herbivores			
Carnivores			
Omnivores			
Decomposers & scavengers			
Decomposing organisms			

prairie ecosystem graph

Complete a bar graph below using the information from the Total column in your data table.



badger

what it eats: Thirteen-lined ground squirrels, northern crawfish frogs, ornate box turtles, three-toed box turtles, plains pocket gophers

what eats it: **Young eaten by**—coyotes

environment: Large areas of flat or rolling grassland

bobcat

what it eats: White-tailed deer, ovenbirds, wild turkeys, black rat snakes

what eats it: **Young eaten by**—Great horned owls, coyotes

environment: Areas with many trees

big bluestem

what it eats: Produces its own food using energy from the sun

what eats it: Thirteen-lined ground squirrels, bobolinks, grasshopper sparrows, upland sandpipers, bobwhite quail, greater prairie-chickens, plains pocket gophers, leaf beetles, prairie voles, grassland crayfish, white-tailed deer

environment: Large area of flat or rolling grassland

bobolink

what it eats: Regal fritillary butterflies, yellow garden spiders, leaf beetles, round-winged katydids, blackberries, compass plants, big bluestem, little bluestem, purple coneflowers, sideoats grama grass, switch grass, Indian grass

what eats it: Northern harrier hawks, bullsnakes

environment: Large area of flat or rolling grassland

blackberries

what it eats: Produces its own food using energy from the sun

what eats it: Bobolinks, pileated woodpeckers, coyotes, plains pocket gophers, prairie voles, white-tailed deer, ornate box turtles, spotted skunks, humans

environment: Land covered with grasses and flowers

bobwhite quail

what it eats: Prairie mound ants, compass plants, big bluestem, little bluestem, sideoats grama grass, switch grass, Indian grass

what eats it: Coyotes, northern harrier hawks, bullsnakes, humans

environment: Area with tall grass

bullsnake

what it eats: Prairie voles, great plains skinks, thirteen-lined ground squirrels, plains pocket gophers, greater prairie-chickens, bobolinks, bobwhite quail, grasshopper sparrows, upland sandpipers

what eats it: Northern harrier hawks, coyotes

environment: A wide area of land with tall grasses

compass plant

what it eats: Produces its own food using energy from the sun

what eats it: Upland sandpipers, bobolinks, grasshopper sparrows, bobwhite quail, prairie voles, leaf beetles, regal fritillary butterflies, white-tailed deer, thirteen-lined ground squirrels

environment: Open grassland

coyote

what it eats: **Living and dead**—round-winged katydids, bullsnakes, speckled kingsnakes, ornate box turtles, bobcats, thirteen-lined ground squirrels, badgers, prairie voles, greater prairie-chickens, bobwhite quail, upland sandpipers; Blackberries

what eats it: Northern harrier hawks, badgers

environment: Wide area of tall grasses

gaura

what it eats: Produces its own food using energy from the sun

what eats it: Prairie voles, white-tailed deer, honeybees, regal fritillary butterflies

environment: Land covered with grasses and flowers

grasshopper sparrow

what it eats: Yellow garden spiders, regal fritillary butterflies, honeybees, leaf beetles, round-winged katydids, prairie mound ants, compass plants, big bluestem, little bluestem, sideoats grama grass, switch grass, Indian grass, purple coneflowers

what eats it: Northern harrier hawks, bullsnakes, speckled kingsnakes

environment: Area with grasses and forbs

grassland crayfish

what it eats: **Living and dead**—leaf beetles, prairie mound ants, big bluestem, little bluestem, switch grass, Indian grass, sideoats grama grass

what eats it: Northern crawfish frogs

environment: Land covered with grasses and flowers

great horned owl

what it eats: Fox squirrels, bobcats, thirteen-lined ground squirrels, spotted skunks, woodland voles, northern harrier hawks, ovenbirds, white-breasted nuthatches, wild turkeys, black rat snakes, speckled kingsnakes

what eats it: Black rat snakes

environment: Areas with many trees

green darner dragonfly

what it eats: **Adults eat**—blue-fronted dancer damselflies, yellow drake mayflies; **Nymphs eat**—predacious diving beetles, green frog tadpoles

what eats it: **Adults eaten by**—green frogs; **Nymphs eaten by**—largemouth bass, predacious diving beetles, green frogs, red-eared slider turtles, northern harrier hawks, yellow garden spiders

environment: Near small, deep bodies of water

great plains skink

what it eats: Yellow garden spiders, round-winged katydids, prairie mound ants, leaf beetles

what eats it: Bullsnakes, speckled kingsnakes, northern harrier hawks

environment: Land covered with grasses and wildflowers

honeybee

what it eats: **Nectar from**—gaura, prairie blazing star, purple coneflowers

what eats it: Grasshopper sparrows, yellow garden spiders, prairie mound ants

environment: Land covered with grasses and flowers

greater prairie-chicken

what it eats: Prairie mound ants, big bluestem, little bluestem, switch grass, Indian grass, sideoats grama grass

what eats it: Bullsnakes, speckled kingsnakes, coyotes

environment: Land covered with grasses and flowers

human

what it eats: Blackberries, bluegill fish, bobwhite quail, channel catfish, common carp, fox squirrels, green frogs, hickory nuts, largemouth bass, mallard ducks, muskrats, raccoons, white-tailed deer, wild turkeys, northern crayfish

what eats it: None

environment: Found in many ecosystems

indian grass

what it eats: Produces its own food using energy from the sun

what eats it: White-tailed deer, leaf beetles, upland sandpipers, bobolinks, bobwhite quail, grasshopper sparrows, greater prairie-chickens, thirteen-lined ground squirrels, prairie voles, grassland crayfish, plains pocket gophers, round-winged katydids

environment: Large area with grasses and forbs

northern crawfish frog

what it eats: Yellow garden spiders, grassland crayfish, prairie mound ants

what eats it: Badgers

environment: Land covered with grasses and flowers

leaf beetle

what it eats: Compass plants, purple coneflowers, big bluestem, little bluestem, Indian grass, switch grass, sideoats grama grass

what eats it: Bobolinks, grasshopper sparrows, great plains skinks, thirteen-lined ground squirrel, grassland crayfish, upland sandpipers, prairie mound ants, ornate box turtles

environment: Large area of flat or rolling grassland

northern harrier hawk

what it eats: Prairie voles, plains pocket gophers, speckled kingsnakes, bullsnakes, great plains skinks, young coyotes, green darner dragonflies, bobolinks, grasshopper sparrows, bobwhite quail

what eats it: Great horned owls

environment: A wide area of land with tall grasses

little bluestem

what it eats: Produces its own food using energy from the sun

what eats it: Thirteen-lined ground squirrels, bobolinks, bobwhite quail, greater prairie-chickens, upland sandpipers, grasshopper sparrows, plains pocket gophers, leaf beetles, prairie voles, white-tailed deer, grassland crayfish

environment: Land covered with grasses and flowers

ornate box turtle

what it eats: Leaf beetles, regal fritillary butterflies, blackberries

what eats it: Coyotes, badgers

environment: Land with grasses and forbs

pileated woodpecker

what it eats: Virginia creeper vines, walking sticks, carpenter ants, io moths, spicebush swallowtail butterflies, termites, white oak trees, redcedar trees, blackberries

what eats it: Black rat snakes

environment: Areas with many trees

prairie mound ant

what it eats: **Dead**—Leaf beetles, honeybees, round-winged katydids, regal fritillary butterflies

what eats it: Great plains skinks, bobwhite quail, grasshopper sparrows, upland sandpipers, greater prairie-chickens, yellow garden spiders, northern crayfish frogs, grassland crayfish, spotted skunks, thirteen-lined ground squirrels

environment: Land covered with grasses and flowers

plains pocket gopher

what it eats: Blackberries, big bluestem, little bluestem, Indian grass, switch grass, sideoats grama grass

what eats it: Badgers, spotted skunks, northern harrier hawks, bullsnakes

environment: A large area of flat or rolling grassland

prairie vole

what it eats: Prairie blazing star, purple coneflowers, gaura, big bluestem, little bluestem, Indian grass, compass plant, sideoats grama grass, switch grass, blackberries

what eats it: Coyotes, bullsnakes, speckled kingsnakes, northern harrier hawks, spotted skunks

environment: A wide area of land with tall grasses and wildflowers

prairie blazing star

what it eats: Produces its own food using energy from the sun

what eats it: Regal fritillary butterflies, honeybees, thirteen-lined ground squirrels, prairie voles, white-tailed deer

environment: A wide area with grasses and forbs

purple coneflower

what it eats: Produces its own food using energy from the sun

what eats it: Honeybees, regal fritillary butterflies, grasshopper sparrows, bobolinks, leaf beetles, prairie voles, thirteen-lined ground squirrels, white-tailed deer

environment: Large area of land covered with grasses and flowers

regal fritillary butterfly

what it eats: Prairie blazing star, compass plants, gaura, purple coneflowers

what eats it: Bobolinks, grassland sparrows, prairie mound ants, yellow garden spiders, ornate box turtles, thirteen-lined ground squirrels

environment: A wide area of land with tall grasses and flowers

speckled kingsnake

what it eats: Prairie voles, great plains skinks, greater prairie-chicken eggs, grasshopper sparrows, upland sandpipers

what eats it: Northern harrier hawks, coyotes, great horned owls

environment: Areas with grasses and forbs

round-winged katydid (pink form)

what it eats: Indian grass, switch grass, sideoats grama grass

what eats it: Bobolinks, grasshopper sparrows, great plains skinks, coyotes, yellow garden spiders, prairie mound ants, thirteen-lined ground squirrels

environment: Area with grasses and forbs

spotted skunk

what it eats: **Living and dead**—prairie voles, plains pocket gophers, prairie mound ants; Blackberries

what eats it: Great horned owls

environment: Land covered with grasses and flowers

sideoats grama grass

what it eats: Produces its own food using energy from the sun

what eats it: Thirteen-lined ground squirrels, bobwhite quail, greater prairie-chickens, bobolinks, upland sandpipers, grasshopper sparrows, prairie voles, grassland crayfish, plains pocket gophers, leaf beetles, round-winged katydids, white-tailed deer

environment: A wide area of land with tall grasses and flowers

switch grass

what it eats: Produces its own food using energy from the sun

what eats it: Thirteen-lined ground squirrels, white-tailed deer, round-winged katydids, prairie voles, bobwhite quail, greater prairie-chickens, upland sandpipers, bobolinks, grassland sparrows, plains pocket gophers, grassland crayfish, leaf beetles

environment: Land covered with grasses and flowers

thirteen-lined ground squirrel

what it eats: Regal fritillary butterflies, round-winged katydids, leaf beetles, prairie mound ants, big bluestem, little bluestem, Indian grass, switch grass, sideoats grama grass, prairie blazing star, purple coneflowers, compass plants

what eats it: Coyotes, badgers, great horned owls, bullsnakes

environment: Area with grasses and forbs

white-tailed deer

what it eats: White oak trees,Virginia creeper vines, mayapples, mosses, shelf mushrooms, flowering dogwood trees, sassafras trees, hickory trees, blue violets, redcedar trees, red maple trees, pin oak trees, black willow trees, little bluestem, big bluestem, switch grass, Indian grass, sideoats grama grass, prairie blazing star, purple coneflowers, gaura, compass plants, blackberries, water primrose

what eats it: Humans, bobcats

environment: Areas with many trees

upland sandpiper

what it eats: Big bluestem, little bluestem, sideoats grama grass, switch grass, Indian grass, compass plants, prairie mound ants, leaf beetles

what eats it: Bullsnakes, speckled kingsnakes, coyotes

environment: Land covered with grasses and flowers

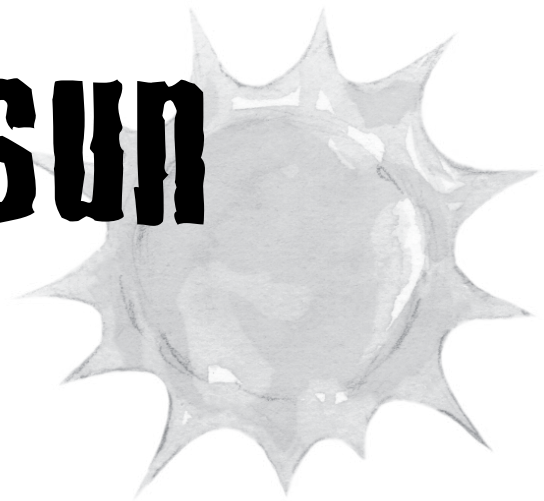
yellow garden spider

what it eats: Regal fritillary butterflies, green darner dragonflies, prairie mound ants, honeybees, round-winged katydids

what eats it: Bobolinks, grasshopper sparrows, great plains skinks, northern crawfish frogs

environment: Land covered with grasses and flowers

sun



Organism	Key
badger **what it eats:** Thirteen-lined ground squirrels, northern crawfish frogs, ornate box turtles, three-toed box turtles, plains pocket gophers **what eats it:** **Young eaten by**—coyotes **environment:** Large areas of flat or rolling grassland	Pond, [Forest], **Prairie** Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
big bluestem **what it eats:** Produces its own food using energy from the sun **what eats it:** Thirteen-lined ground squirrels, bobolinks, grasshopper sparrows, upland sandpipers, bobwhite quail, greater prairie-chickens, plains pocket gophers, leaf beetles, prairie voles, grassland crayfish, white-tailed deer **environment:** Large area of flat or rolling grassland	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
blackberries **what it eats:** Produces its own food using energy from the sun **what eats it:** Bobolinks, pileated woodpeckers, coyotes, plains pocket gophers, prairie voles, white-tailed deer, ornate box turtles, spotted skunks, humans **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
bobcat **what it eats:** White-tailed deer, ovenbirds, wild turkeys, black rat snakes **what eats it:** **Young eaten by**—Great horned owls, coyotes **environment:** Areas with many trees	Pond, **Forest**, [Prairie] Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
bobolink **what it eats:** Regal fritillary butterflies, yellow garden spiders, leaf beetles, round-winged katydids, blackberries, compass plants, big bluestem, little bluestem, purple coneflowers, sideoats grama grass, switch grass, Indian grass **what eats it:** Northern harrier hawks, bullsnakes **environment:** Large area of flat or rolling grassland	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
bobwhite quail **what it eats:** Prairie mound ants, compass plants, big bluestem, little bluestem, sideoats grama grass, switch grass, Indian grass **what eats it:** Coyotes, northern harrier hawks, bullsnakes, humans **environment:** Area with tall grass	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
bullsnake **what it eats:** Prairie voles, great plains skinks, thirteen-lined ground squirrels, plains pocket gophers, greater prairie-chickens, bobolinks, bobwhite quail, grasshopper sparrows, upland sandpipers **what eats it:** Northern harrier hawks, coyotes **environment:** A wide area of land with tall grasses	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
compass plant **what it eats:** Produces its own food using energy from the sun **what eats it:** Upland sandpipers, bobolinks, grasshopper sparrows, bobwhite quail, prairie voles, leaf beetles, regal fritillary butterflies, white-tailed deer, thirteen-lined ground squirrels **environment:** Open grassland	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
coyote **what it eats:** **Living and dead**—round-winged katydids, bullsnakes, speckled kingsnakes, ornate box turtles, bobcats, thirteen-lined ground squirrels, badgers, prairie voles, greater prairie-chickens, bobwhite quail, upland sandpipers; Blackberries **what eats it:** Northern harrier hawks, badgers **environment:** Wide area of tall grasses	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, **Scavenger** **Prey**, **Predator**
gaura **what it eats:** Produces its own food using energy from the sun **what eats it:** Prairie voles, white-tailed deer, honeybees, regal fritillary butterflies **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator

Organism	Key
grasshopper sparrow **what it eats:** Yellow garden spiders, regal fritillary butterflies, honeybees, leaf beetles, round-winged katydids, prairie mound ants, compass plants, big bluestem, little bluestem, sideoats grama grass, switch grass, Indian grass, purple coneflowers **what eats it:** Northern harrier hawks, bullsnakes, speckled kingsnakes **environment:** Area with grasses and forbs	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
grassland crayfish **what it eats:** **Living and dead**—leaf beetles, prairie mound ants, big bluestem, little bluestem, switch grass, Indian grass, sideoats grama grass **what eats it:** Northern crawfish frogs **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, **Decomposer**, **Scavenger** **Prey**, **Predator**
great horned owl **what it eats:** Fox squirrels, bobcats, thirteen-lined ground squirrels, spotted skunks, woodland voles, northern harrier hawks, ovenbirds, white-breasted nuthatches, wild turkeys, black rat snakes, speckled kingsnakes **what eats it:** Black rat snakes **environment:** Areas with many trees	Pond, **Forest**, [Prairie] Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
great plains skink **what it eats:** Yellow garden spiders, round-winged katydids, prairie mound ants, leaf beetles **what eats it:** Bullsnakes, speckled kingsnakes, northern harrier hawks **environment:** Land covered with grasses and wildflowers	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
greater prairie-chicken **what it eats:** Prairie mound ants, big bluestem, little bluestem, switch grass, Indian grass, sideoats grama grass **what eats it:** Bullsnakes, speckled kingsnakes, coyotes **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
green darner dragonfly **what it eats:** **Adults eat**—blue-fronted dancer damselflies, yellow drake mayflies; **Nymphs eat**—predacious diving beetles, green frog tadpoles **what eats it:** **Adults eaten by**—green frogs; **Nymphs eaten by**—largemouth bass, predacious diving beetles, green frogs, red-eared slider turtles, northern harrier hawks, yellow garden spiders **environment:** Near small, deep bodies of water	**Pond**, Forest, (Prairie) Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
honeybee **what it eats:** **Nectar from**—gaura, prairie blazing star, purple coneflowers **what eats it:** Grasshopper sparrows, yellow garden spiders, prairie mound ants **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
human **what it eats:** Blackberries, bluegill fish, bobwhite quail, channel catfish, common carp, fox squirrels, green frogs, hickory nuts, largemouth bass, mallard ducks, muskrats, raccoons, white-tailed deer, wild turkeys, northern crayfish **what eats it:** None **environment:** Found in many ecosystems	**Pond**, **Forest**, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger Prey, **Predator**
indian grass **what it eats:** Produces its own food using energy from the sun **what eats it:** White-tailed deer, leaf beetles, upland sandpipers, bobolinks, bobwhite quail, grasshopper sparrows, greater prairie-chickens, thirteen-lined ground squirrels, prairie voles, grassland crayfish, plains pocket gophers, round-winged katydids **environment:** Large area with grasses and forbs	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator

Organism	Key
leaf beetle **what it eats:** Compass plants, purple coneflowers, big bluestem, little bluestem, Indian grass, switch grass, sideoats grama grass **what eats it:** Bobolinks, grasshopper sparrows, great plains skinks, thirteen-lined ground squirrel, grassland crayfish, upland sandpipers, prairie mound ants, ornate box turtles **environment:** Large area of flat or rolling grassland	Pond, Forest, **Prairie** Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
little bluestem **what it eats:** Produces its own food using energy from the sun **what eats it:** Thirteen-lined ground squirrels, bobolinks, bobwhite quail, greater prairie-chickens, upland sandpipers, grasshopper sparrows, plains pocket gophers, leaf beetles, prairie voles, white-tailed deer, grassland crayfish **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
northern crawfish frog **what it eats:** Yellow garden spiders, grassland crayfish, prairie mound ants **what eats it:** Badgers **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
northern harrier hawk **what it eats:** Prairie voles, plains pocket gophers, speckled kingsnakes, bullsnakes, great plains skinks, young coyotes, green darner dragonflies, bobolinks, grasshopper sparrows, bobwhite quail **what eats it:** Great horned owls **environment:** A wide area of land with tall grasses	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**
ornate box turtle **what it eats:** Leaf beetles, regal fritillary butterflies, blackberries **what eats it:** Coyotes, badgers **environment:** Land with grasses and forbs	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
pileated woodpecker **what it eats:** Virginia creeper vines, walking sticks, carpenter ants, io moths, spicebush swallowtail butterflies, termites, white oak trees, redcedar trees, blackberries **what eats it:** Black rat snakes **environment:** Areas with many trees	Pond, **Forest**, [Prairie] Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
plains pocket gopher **what it eats:** Blackberries, big bluestem, little bluestem, Indian grass, switch grass, sideoats grama grass **what eats it:** Badgers, spotted skunks, northern harrier hawks, bullsnakes **environment:** A large area of flat or rolling grassland	Pond, Forest, **Prairie** Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
prairie blazing star **what it eats:** Produces its own food using energy from the sun **what eats it:** Regal fritillary butterflies, honeybees, thirteen-lined ground squirrels, prairie voles, white-tailed deer **environment:** A wide area with grasses and forbs	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
prairie mound ant **what it eats:** **Dead**—Leaf beetles, honeybees, round-winged katydids, regal fritillary butterflies **what eats it:** Great plains skinks, bobwhite quail, grasshopper sparrows, upland sandpipers, greater prairie-chickens, yellow garden spiders, northern crayfish frogs, grassland crayfish, spotted skunks, thirteen-lined ground squirrels **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, Omnivore, Carnivore, **Decomposer**, **Scavenger** **Prey**, **Predator**
prairie vole **what it eats:** Prairie blazing star, purple coneflowers, gaura, big bluestem, little bluestem, Indian grass, compass plant, sideoats grama grass, switch grass, blackberries **what eats it:** Coyotes, bullsnakes, speckled kingsnakes, northern harrier hawks, spotted skunks **environment:** A wide area of land with tall grasses and wildflowers	Pond, Forest, **Prairie** Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator

Organism	Key
purple coneflower **what it eats:** Produces its own food using energy from the sun **what eats it:** Honeybees, regal fritillary butterflies, grasshopper sparrows, bobolinks, leaf beetles, prairie voles, thirteen-lined ground squirrels, white-tailed deer **environment:** Large area of land covered with grasses and flowers	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
regal fritillary butterfly **what it eats:** Prairie blazing star, compass plants, gaura, purple coneflowers **what eats it:** Bobolinks, grassland sparrows, prairie mound ants, yellow garden spiders, ornate box turtles, thirteen-lined ground squirrels **environment:** A wide area of land with tall grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
round-winged katydid (pink form) **what it eats:** Indian grass, switch grass, sideoats grama grass **what eats it:** Bobolinks, grasshopper sparrows, great plains skinks, coyotes, yellow garden spiders, prairie mound ants, thirteen-lined ground squirrels **environment:** Area with grasses and forbs	Pond, Forest, **Prairie** Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
sideoats grama grass **what it eats:** Produces its own food using energy from the sun **what eats it:** Thirteen-lined ground squirrels, bobwhite quail, greater prairie-chickens, bobolinks, upland sandpipers, grasshopper sparrows, prairie voles, grassland crayfish, plains pocket gophers, leaf beetles, round-winged katydids, white-tailed deer **environment:** A wide area of land with tall grasses and flowers	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
speckled kingsnake **what it eats:** Prairie voles, great plains skinks, greater prairie-chicken eggs, grasshopper sparrows, upland sandpipers **what eats it:** Northern harrier hawks, coyotes, great horned owls **environment:** Areas with grasses and forbs	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
spotted skunk **what it eats:** **Living and dead**—prairie voles, plains pocket gophers, prairie mound ants; Blackberries **what eats it:** Great horned owls **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, **Scavenger** **Prey**, **Predator**
switch grass **what it eats:** Produces its own food using energy from the sun **what eats it:** Thirteen-lined ground squirrels, white-tailed deer, round-winged katydids, prairie voles, bobwhite quail, greater prairie-chickens, upland sandpipers, bobolinks, grassland sparrows, plains pocket gophers, grassland crayfish, leaf beetles **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** **Producer**, Consumer Herbivore, Omnivore, Carnivore, Decomposer, Scavenger Prey, Predator
thirteen-lined ground squirrel **what it eats:** Regal fritillary butterflies, round-winged katydids, leaf beetles, prairie mound ants, big bluestem, little bluestem, Indian grass, switch grass, sideoats grama grass, prairie blazing star, purple coneflowers, compass plants **what eats it:** Coyotes, badgers, great horned owls, bullsnakes **environment:** Area with grasses and forbs	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**
upland sandpiper **what it eats:** Big bluestem, little bluestem, sideoats grama grass, switch grass, Indian grass, compass plants, prairie mound ants, leaf beetles **what eats it:** Bullsnakes, speckled kingsnakes, coyotes **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, **Omnivore**, Carnivore, Decomposer, Scavenger **Prey**, **Predator**

Organism	Key
white-tailed deer **what it eats:** White oak trees,Virginia creeper vines, mayapples, mosses, shelf mushrooms, flowering dogwood trees, sassafras trees, hickory trees, blue violets, redcedar trees, red maple trees, pin oak trees, black willow trees, little bluestem, big bluestem, switch grass, Indian grass, sideoats grama grass, prairie blazing star, purple coneflowers, gaura, compass plants, blackberries, water primrose **what eats it:** Humans, bobcats **environment:** Areas with many trees	(Pond), **Forest**, (Prairie) Producer, **Consumer** **Herbivore**, Omnivore, Carnivore, Decomposer, Scavenger **Prey**, Predator
yellow garden spider **what it eats:** Regal fritillary butterflies, green darner dragonflies, prairie mound ants, honeybees, round-winged katydids **what eats it:** Bobolinks, grasshopper sparrows, great plains skinks, northern crawfish frogs **environment:** Land covered with grasses and flowers	Pond, Forest, **Prairie** Producer, **Consumer** Herbivore, Omnivore, **Carnivore**, Decomposer, Scavenger **Prey**, **Predator**

activity 5.4 : schoolyard ecosystem investigation

estimated time 30–40 minutes

objectives

Students will be able to

1. Identify producers, consumers (herbivores, carnivores and omnivores), decomposers and scavengers in their schoolyard.
2. Explain the role producers, consumers, decomposers and scavengers play in their schoolyard ecosystem.
3. Give a group presentation on schoolyard observations.

teacher preparation

This is an outdoor activity.Take a brief walk around the schoolyard and note where you find examples of producers, consumers, scavengers and decomposers. During the course of the activity, if students are unsure and/or unable to find examples, refer to your notes and provide subtle prompts for students to discover examples.

This activity is designed to allow students to continue to explore their schoolyard ecosystem as they have been doing during this unit. However, this activity will allow students to observe the organisms living and interacting there more closely.

materials

Science notebooks
Pencils
Thermometers
Heavy string or rope looped in a circle *OR* wire hangers stretched into circle-like shapes (*OR* hula hoops if available)
Hand lenses or loupes
Small collection boxes with or without magnification on the lid
Field guides

procedure

1. Have students complete their science notebook headings and take and record outside air temperature.

2. Explain to students that they will use their science notebooks to record, organize and present in any way they choose (either alone or in groups) data from their schoolyard ecosystem—at a distance (a big picture) and up close. Distance observation of the big picture should be done while sitting or standing in one place and quietly watching the organisms around them at a distance. Birds and squirrels at the bird feeders would fall into this category as would trees, plants and animals within their field of vision and animals moving through or seeds blowing by their field of vision.This could also include watching a butterfly land on their arm and observing it with a hand lens.

3. For the up-close investigation, show students the materials they may use: certain number of viewing boxes per student/group; heavy string or wire hangers; hand lenses or loupes. Demonstrate how these things should be used for the up-close observations.
   a. Viewing boxes are for temporary storage and viewing of organisms found within the area of the hula hoop or wire hanger and small enough for the organism to fit comfortably inside the box with the lid in place.
   b. Heavy string or wire hangers are to be placed somewhere in the schoolyard ecosystem (according to boundaries and guidelines set by teacher) in such a way that they define a small area within their edges. Students are to spend time observing as many organisms and interactions within the area of the string or the wire hanger and record all observations in their science notebooks. If used, hula hoops may be placed flat on the ground over a grassy spot, over an area worn down by foot traffic, at a corner of a building, over the area below a fence, or they may be placed up against the base of a tree, hung from a branch of a tree so that the hoop is up against the tree trunk, placed on a large log, etc. to observe a more vertical surface.
   c. Hand lenses or loupes should be handled carefully and used to magnify organisms students wish to observe without disturbing the organisms.

4. Move around the schoolyard and ask questions to encourage students/groups to look more closely, draw conclusions, decide to move, use a field guide to identify their organisms, consider ways to compare and contrast hula hoop-sized areas, etc. (Ex: organisms observed within the hanger set down on the flower garden compared to organisms observed within the hanger set down on the sidewalk or an area of grass worn down due to foot traffic, people cutting across a lawn instead of walking around the edge on the sidewalk, etc.). Check that students have engaged in both the big picture and the up-close observations.

5. Have students enter any new organisms from both types of observation on their *Big Chart: Schoolyard Ecosystem* in their science notebooks and check off the appropriate boxes: animal or plant; producer or consumer; herbivore, carnivore, omnivore, decomposer or scavenger.

6. Have students/groups work on organizing their data and preparing their presentations. Presentations should include (for both the broad and the up-close observations):
   a. Number and type of organisms.
   b. Where these organisms were observed.
   c. Interactions observed between or among organisms.
   d. Roles these organisms play in the schoolyard ecosystem.
   e. Reasons behind locations chosen.
   f. Comparison/contrast between different locations and possible explanation for differences/similarities.
   g. Two interactions they observed that were unexpected and surprised them.
   h. One or more questions they have about something(s) they observed.
   i. One or more things they would like to investigate further based on their observations.
   j. Which form of observation (big picture or up-close) provided the most data.
   k. Which form of observation would they like to do again and why.

Wrap-up/formative assessment See *Wrap-Up/Formative Assessments* in the Teacher Notes section of the introductory material to choose a strategy that meets student needs.

optional activity 5.a : animal teeth—it's all about the food

estimated time 30 minutes

objectives

Students will be able to

1. Explain how the teeth on an animal's skull can help identify the type of consumer it is.
2. Identify mammal skulls as belonging to an herbivore, carnivore or omnivore.

teacher preparation

This activity may be done indoors or outdoors. Have *Worksheet 5.A: It's All About the Food* photocopied for each student. Groups of two to three students should work together and record the information on individual worksheets to be included in their science notebooks. Students will need their student books to reference the three skull illustrations on page 26.

materials

Pencils
Thermometers (if outdoors)
Class copies of *Worksheet 5.A: It's All About the Food*
Student books
Flip chart/whiteboard and markers

procedure

1. Have students work in small groups. Instruct students to open their student books to page 26 in Chapter 5 and study and discuss the three skulls illustrated there. Have students note at least two specialized tooth structures on each of the three animal skulls and discuss how these tooth structures might help these animals.

2. Have groups share their information. Compile their answers on a flip chart, white board, etc.

3. Student answers may vary but should include:
   a. The white-tailed deer has sharp front teeth on its lower jaw that help it snip off grasses and leaves; wide, flatter teeth in the back of the mouth that help crush seeds and tough plant parts; no front teeth on its upper jaw.
   b. The bobcat has sharp front teeth that grip and tear up meat; large, flat teeth that line the sides of its mouth for grinding up meat and bones; long, sharp, pointed teeth on either side of sharp front teeth, also for gripping and tearing meat.
   c. The raccoon has some teeth like herbivores and carnivores: sharp, front teeth for gripping and tearing meat and snipping off plants; sharp, pointed teeth on either side of sharp front teeth for gripping and tearing meat; flat teeth that line the sides of a raccoon's mouth that help crush seeds and tough plant parts.

4. What conclusions might be drawn from the information on the flip chart/white board?

5. Answers may vary but should include:
   a. Herbivores have snipping and grinding teeth because these teeth help them chew up plants.
   b. Carnivores have sharp front teeth for gripping and tearing plus flat grinding teeth plus two sharp, pointed teeth on the sides of the front teeth for gripping and tearing, and all of these teeth help carnivores grab, tear up and grind down meat (or the flesh and bones of animals).
   c. Omnivores have teeth similar to both herbivores and carnivores because they eat plants and animals and need to grip, tear and grind both tough plants and meat.

6. Distribute *Worksheet 5.A: It's All About the Food* to each student. Instruct them to look carefully at the side view of each skull, especially the teeth, discuss other characteristics of the skull, and from the list at the bottom of the chart, choose which skull belongs to which animal and decide whether that animal is an herbivore, a carnivore or an omnivore. Answers should be written on the worksheet.

7. Have groups take turns picking skulls and sharing their discussions, answer choices and reasons for choosing those answers with the class.

Worksheet 5.A—It's All About the Food

Name ______________________________

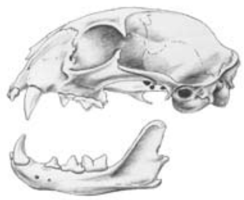
Group Member Names ____

Animal ____________________

Type of eater ________________

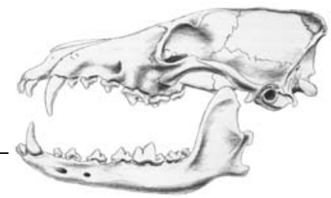
Animal ____________

Type of eater ________________



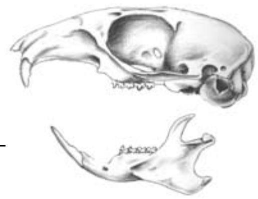
Animal ____________________

Type of eater ________________



Animal _______________

Type of eater ________________



Animal ____________________

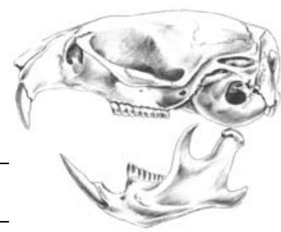
Type of eater ________________

Animal __________________

Type of eater ________________

Animal ____________________

Type of eater ________________

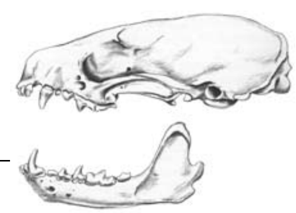


Animal __________________

Type of eater ______________

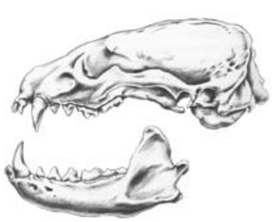
Animal ____________________

Type of eater ________________



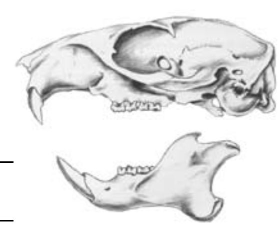
Animal __________________

Type of eater ________________



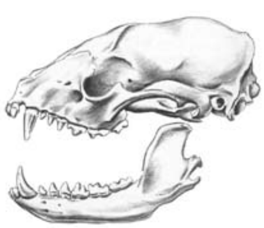
Animal ___________________

Type of eater ______________



Animal __________________

Type of eater ______________



Animal ____________________

Type of eater ______________

choices

Badger	Fox squirrel	Thirteen-lined ground squirrel
Beaver	Muskrat	White-tailed deer
Bobcat	Raccoon	Woodland vole
Coyote	Prairie vole	
Flying squirrel	Spotted skunk	

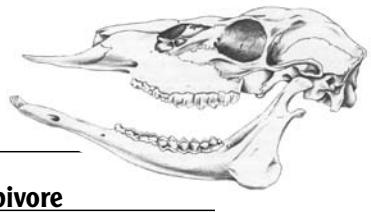
Charles W. Schwartz artwork

Name _____

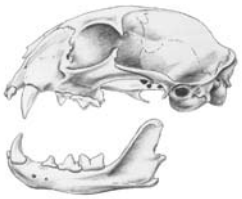
Group Member Names _____

Animal Beaver
Type of eater Herbivore

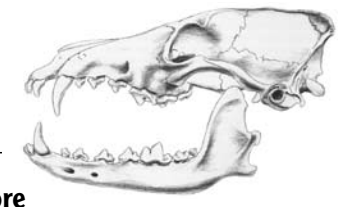
Animal Deer
Type of eater Herbivore



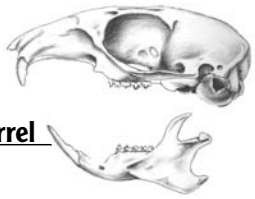
Animal Bobcat
Type of eater Carnivore



Animal Coyote
Type of eater Omnivore



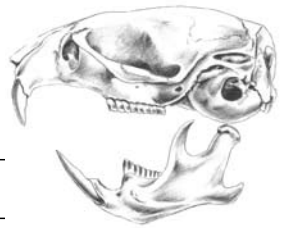
Animal Thirteen-lined ground squirrel
Type of eater Omnivore



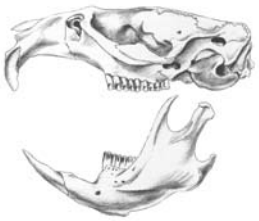
Animal Woodland vole
Type of eater Herbivore

Animal Flying squirrel
Type of eater Omnivore

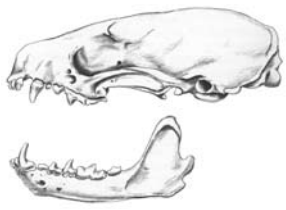
Animal Prairie vole
Type of eater Omnivore



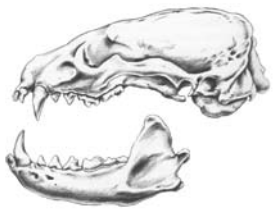
Animal Muskrat
Type of eater Omnivore



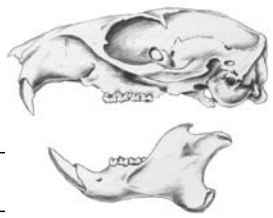
Animal Spotted skunk
Type of eater Omnivore



Animal Badger
Type of eater Carnivore



Animal Fox squirrel
Type of eater Herbivore



Animal Raccoon
Type of eater Omnivore

choices

Badger	Fox squirrel	Thirteen-lined ground squirrel
Beaver	Muskrat	White-tailed deer
Bobcat	Raccoon	Woodland vole
Coyote	Prairie vole	
Flying squirrel	Spotted skunk	

Charles W. Schwartz artwork

optional activity 5.b : life on the forest floor

estimated time
30–45 minutes

objectives
1. Students understand the importance of woody debris in habitat areas.
2. Students understand that insects and decomposers are important forms of wildlife.
3. Students use observation skills and tools to discover animals they might not normally see.

description
Students explore decaying woody plants to find evidence of wildlife and plants that live in the decomposing material on the forest floor. Students use magnifiers to see this evidence, then examine and explain the importance of such decaying matter in the cycle of renewal of the habitat area.

teacher preparation
Collect about 1 cubic foot of decaying woody debris from a forest area with decomposing stumps and branches (the more lichen and moss the better). Store in a plastic bag in a dark, cool place until ready for use. Return this material to the habitat area when finished with the activity. If gathering woody debris from another habitat area, take care not to inadvertently introduce exotic species (such as ivy or bindweed) into your habitat area.

materials
Science notebooks
Pencils
Magnifiers
Decaying log, leaves, branches, etc.
Life on the Forest Floor poster

procedure
1. Go to natural habitat area and find a forested area with trees and shrubs. Ask students "What wildlife might live in the forest floor?" State that, "There are thousands, even millions of wildlife that live in the woody debris and forest duff in this natural area."

2. Look for leaves and branches that have fallen to the ground over the seasons as part of their life cycle (deciduous, evergreen). Tell students that this is called forest duff and woody debris. Forest duff is the leafy, woody mulch that makes up the top layer of soil. Touch and feel forest duff. How does it feel? (moist, spongy, cool, soft, etc.)

3. Look for evidence of woody debris that has begun to decay, especially stumps, logs or other large material. Ask, "What do you observe?" (wood is breaking apart, moss and lichen are growing on it, plants grow on it)

4. Form students into groups of three to four. Pass out magnifiers and distribute pieces of woody debris. Have students share woody debris and observations with each other.

5. Ask students to look for evidence or actual sightings of tiny wildlife and plants in the woody debris. Have them use magnifiers to find and locate microscopic organisms. Help students locate and recognize tiny microorganisms, as well as fungal roots, egg masses, etc.

6. Science notebooks: Draw and record information about an animal or plant seen living in the woody debris (lichens, moss, decomposers, insects, roots, seeds, etc.). Ask students to label as possible (animal/plant, name, parts).

7. Share findings and discuss, "What are we observing in the woody debris? (micro organisms and the process of breaking down large matter into small) How does woody debris fit into the 'cycle of renewal' in our habitat area? (decomposition, decomposers) Why is woody debris important? What does it turn into? (humus, soil nutrients) How? (decomposition) What would happen if woody debris did not decompose?" (there would be a mountain of woody debris, plants couldn't grow)

8. Conclude, "One handful of forest duff can contain millions of organisms important for plant growth. It is amazing to think so much new plant growth in the forests begins in woody debris."

Developed by Heidi Bohan/Starflower Foundation
(adapted with permission from the Washington Native Plant Society/Starflower Foundation)

optional activity 5.c : worms in school

estimated time
Bin set-up time: 15 minutes; Activity on-going

objective
Students will be able to
1. Explain the role of decomposers in an ecosystem.

teacher preparation
- *Eisenia foetida*, commonly called redworms, are best suited for bins. As surface dwellers, they process large amounts of organic material in their natural habitats of manure, compost piles and decaying leaves. They reproduce quickly and love to eat a variety of kitchen wastes.
- Worms have no eyes, but are extremely sensitive to light which they "see" via special skin cells located at the head and tail end of their body.
- Worms have no lungs to breathe with as we do. Their moist skin allows them to "breathe" oxygen into their body and release carbon dioxide from inside their body into the surrounding bedding.
- Worms, in nature, will usually live and die within the same year. Worms in a worm bin may live up to five years.
- An earthworm can move a stone that is fifty times its own weight.
- A mature redworm (four to six weeks old) can mate and produce two to three cocoons per week. Two to five baby worms can hatch from each cocoon in only three weeks.
- A single worm has both male and female reproductive organs, but it still takes two worms to reproduce.

Wonder Worm Bins

When food scraps are thrown into the garbage, a valuable resource is lost. Composting with worms or vermicomposting provides an alternative method for disposing of kitchen waste. Maintaining a worm bin is fun, educational and will reduce household waste while providing you with a source of natural nutrients for your plants.

Worm Bin Recipe
- 1 dark plastic storage bin (10–14 gallons) with a snug-fitting lid (such as a Rubbermaid Roughtote). Choose size according to food waste produced. Rule of thumb: One square foot of surface space is needed for each pound of food waste produced per week.
- Newspaper or shredded paper
- Jug or bucket of water
- 1 handful of garden soil
- 1 pound of redworms
- Food waste

1. Drill small holes on lid and along top 2–4 inches of bin to allow for good aeration.
2. Make bedding by ripping newspapers into 1-inch strips. Put the paper in the container.
3. Mix water into newspaper until bedding is thoroughly moistened. There should be no standing water in bottom of container.
4. Mix in soil. Fluff bedding.
5. Spread worms over top of bedding.
6. Bury food waste. Cover bin and place in a location where the temperature will remain 55–77 degrees Fahrenheit.

worm bins FAQ
What kind of food can I put in the worm bin?

Worms will eat most anything. A list of their favorites is given below. Feed your worms a good variety of produce scraps to keep an even chemical balance in the soil, which keeps them healthy. Mostly fruit or tomato waste could make the soil too acidic.

Apples	Cabbage	Cucumbers	Onion peels	Pizza crust
Apple cores	Cake	Egg shells*	Orange peels	Potato peels
Baked beans	Carrots	Grapefruit peels	Pancakes	Tea leaves
Banana peels	Cereal	Lettuce	Pears	Tomatoes
Biscuits	Coffee grounds	Oatmeal	Pineapple rind	

**good source of calcium carbonate, necessary for worm reproduction*

How much do worms eat?
Redworms eat almost half of their body weight each day. If you start with a pound of worms, you can feed them 3–5 pounds a week. Don't worry about the worms when you go on vacation for a couple of weeks. The worms will eat the bedding when no food waste is available.

Will there be odors and bugs?
A properly maintained bin should not give off any offensive odors. Avoid adding meat scraps, and always completely bury all food waste in the bin. Burying fruit waste will prevent fruit flies from being attracted to the worm bin. Air is necessary for the worms and other microorganisms to work effectively. Without air you may develop anaerobic conditions which will allow gas producing microorganisms to thrive. To avoid fruit flies, freeze food waste before adding to the bin.

Will I need to add more bedding?
Add bedding every 3–5 weeks or when there is not enough bedding material to completely bury the food waste. Other suitable sources for bedding are shredded office paper or shredded corrugated cardboard.

When and how can I use the vermicompost?
The redworms will work most productively when they live in 55–77 degrees Fahrenheit, are fed, kept moist and minimally disturbed. Given these conditions you will have compost available within a few months. The worm castings (or vermicompost) are very rich in nutrients for plants. You may work the vermicompost into garden soil, add a spoonful periodically to indoor plant soil, or water plants with compost tea.

What is the best way to harvest the vermicompost?
The easiest method is the "Divide and Dump" technique. You simply remove about two-thirds of your vermicompost, worms and all, and dump directly onto your garden. Add fresh bedding to the vermicompost that is still in the box. There will be enough worms and cocoons remaining to repopulate the worm bin.

You can let the worms do the sorting for you by putting the vermicompost and worms to one side of the worm bin. Then add new bedding to the empty side. Bury your food waste in the new bedding only. The worms will move over to the new bedding in search of food. After two to three months the vermicompost can be harvested. You can continue this back and forth method to simplify your harvest of future vermicompost.

Another method is to dump and hand sort the worms from the vermicompost. First dump your worm bin out onto a large sheet of plastic. Make several cone-shaped piles. When the light is very bright the worms will quickly move into the center of each pile. After about five minutes, you will not be able to see the worms. Gently remove the outer surface of each pile, exposing the worms to the light and sending them deeper into the pile. Following this process you will eventually end up with a container of vermicompost and a mass of pure worms. It's a good idea to have fresh bedding made up before getting started with this method so you can refill your empty bin and add the worms as you sort.

Where can I get redworms?
Flowerfield Enterprises
10332 Shaver Rd.
Kalamazoo, MI 49002
(616) 327-0108
www.wormwoman.com

Other suppliers via:
www.wormdigest.org

Also check your local bait shop for redworms. Don't be surprised if they don't know them as redworms. They are also commonly called red wigglers, red hybrids or manure worms. If you are successful in finding redworms in your bait store, you may find them to be more expensive than ordering from a grower. Growers sell by the pound (approximately 800 to 1,000 worms), where bait shops usually sell by the dozen.

For additional information on using worms in your classroom: *Worms Eat My Garbage* (book)

Created by Melanie Carden-Jessen, Missouri Department of Conservation

so, what do you know?—lesson 5

1. What do herbivores eat?

2. What do carnivores eat?

3. What do omnivores eat?

4. Using the information you have learned in this unit, circle all of the categories you fit in.

   Producer Consumer Herbivore Carnivore Omnivore

5. What role do decomposers play in an ecosystem?

6. For each living thing, place an X in the column or columns that apply. Some living things fit under more than one category.

	Producer	Consumer	Herbivore	Carnivore	Omnivore	Decomposer	Pond ecosystem	Forest ecosystem	Prairie ecosystem
Blackberries									
Bobcat									
Bobwhite quail									
Cattail									
Duckweed									
Green darner dragonfly									
Largemouth bass									
Little bluestem									
Mayapple									
Pond snail									
Red-eared slider turtle									
Regal fritillary butterfly									
Round-winged katydid									
Shelf mushroom									
Sowbug									
Termite									
White oak tree									

so, what do you know?—lesson 5

answer key

1. What do herbivores eat? (1 point)

   answer Plants

2. What do carnivores eat? (1 point)

   answer Animals

3. What do omnivores eat? (1 point)

   answer Plants and animals

4. Using the information you have learned in this unit, circle all of the categories you fit in. (2 points)

   Producer Consumer Herbivore Carnivore Omnivore

   answer should include Consumer *AND* herbivore or omnivore

5. What role do decomposers play in an ecosystem? (2 points)

   answer —Decomposers eat and break down scat, or animal droppings, and dead plants and animals into tiny pieces.
   OR Other answers that convey the same meaning.

6. For each living thing, place an X in the column or columns that apply. Some living things fit under more than one category. (1 point for each X in the correct row and column; max. 40 points)

	Producer	Consumer	Herbivore	Carnivore	Omnivore	Decomposer	Pond ecosystem	Forest ecosystem	Prairie ecosystem
Blackberries	X								X
Bobcat		X		X				X	[X]
Bobwhite quail		X			X				X
Cattail	X						X		
Duckweed	X						X		
Green darner dragonfly		X		X			X		[X]
Largemouth bass		X		X			X		
Little bluestem	X								X
Mayapple	X							X	
Pond snail		X	X				X		
Red-eared slider turtle		X			X		X		
Regal fritillary butterfly		X	X						X
Round-winged katydid		X	X						X
Shelf mushroom						X		X	
Sowbug		X				X		X	
Termite		X				X		X	
White oak tree	X							X	